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PHILIP MILLS JONES, M. D., Secretary and Editor

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EDITORIAL NOTES

POLITICS.

It has reached the attention of the Editor of your JOURNAL that certain members of the State Society, mostly in the southern part of the state, have acquired the curious belief that he is in some way "mixed up in politics" and is trying to use the JOURNAL for political purposes. The correct definition of "politics" is the science of government and under that definition and to that extent alone, is the Editor in any way interested in "politics." The good of the medical profession in general and of the State Society in particular and the improvement of public health conditions as they touch upon the domain of the physician, are now and have always been the sole aim and object of the work of the Editor and the Secretary of your Society for twelve years. Party politics or political parties have no special interest for him. It does not matter who proposes and secures the passage of a good bill, be he Socialist, Prohibitionist, Democrat, Republican, or what you will. It does not matter what the name of a party may be to which a governor claims allegiance, so long as he is a good governor and serves the whole people and not his own selfish interests or the interests of his friends. The question of parties has nothing to do with the question of true politics—the science of government. The trouble seems to be mostly due to the fact that so few people are able to take the discussion of any question impersonally; they always must inject a personal element somewhere. If a certain individual, be he governor or dog catcher, is criticized, they must needs rush to the conclusion that the critic has some personal animosity against the criticized, or that there is an ulterior reason for the criticism. It is sad that this should be so, and yet it *is* so. Every day we see heated arguments going on about more or less abstract or trivial things, and almost invariably the argument reduces itself, before its end, to a mere personal one and not infrequently to personal epithet. The Editor of your JOURNAL does not know, off hand, to what political party a half dozen members of the legislature belong; but he does know the names of a number who acted very peculiarly or very unwisely at the last session. True politics, the science of government for the good of the people, is the only thing that interests him or that actuates him in shaping the policy of the JOURNAL. As this seems to be a somewhat personal editorial note, it may be as well to add that so far as he knows, personal bias has never influenced any comment or editorial note written by him, that has ever appeared in the JOURNAL. On one or two occasions things have arisen that have involved an individual personally distasteful to the Editor and in such cases he has ignored the subject entirely rather than take the chance of being biased in his opinion. So long as the present Editor remains in charge of the JOURNAL, that rule of impartiality will be followed; no friend and no follower of any political party will be spared deserved criticism for acts that are not for the good of the people or the advancement of the medical profession. After twelve years, the majority of the members of the Society have found that they have not been lied to, deceived or led astray by the Secretary-Editor and they, at least, will know that these statements, so seriously and so earnestly made, are true in fact and in spirit.

REPORTING ACCIDENTS.

There seems to be some confusion in the minds of a good many physicians as to the proper procedure required under the Liability and Compensation Law. Any accident causing a loss of industrial time of more than one week, must be reported by the employer and by the physician in attendance within ten days after the happening of the accident, to the Industrial Accident Board, 907 Royal Insurance Building, Pine and Sansome streets, San Francisco, California. Failure to report such cases within the required time is a misdemeanor and may be punished by a fine of $100, but any member of the board has the right to extend the time for good cause shown. If a patient, we will suppose, is injured in an accident in the country and is later sent to some large town or city to be treated by a specialist, or another physician or surgeon, the second physician or the specialist must make the same report to the Industrial Accident Board, just as though he were the first physician to see the patient. A number of inquiries have come to this office and we would suggest that all our members who are not familiar with the details and the working of the Act, address the Industrial Accident Board with a request for their circular of information, report blanks, etc.

SHOOTING AT STRAWS.

One of the evils—or problems—that is mostly within the domain of the laity and that merely touches the territory of the physician, is the abortion problem. When the general public shall say that every woman who becomes pregnant shall have her child, unless physical disability prevents, then the abortionist will go out of business. But it is a problem that is distinctly "up to the public" and not to the medical profession. In but rare instances does a physician produce the cause for which illegal relief is demanded. In connection with this is the rather interesting letter which the president of a certain county society wrote to a member who had complained that there were "many notorious abortionists and some in the society" and wanted to know what the society was going to do about it. Here follows the letter:

My dear Doctor:—

Your letter of the 9th inst. interests me very much but is scarcely in a form to be presented to the Directors of the County Society. Certain facts may be notorious but I must confess I have not heard of them. In its present shape your communication might be classed as an anonymous denunciation.

If you can indicate the names of the individuals that are notorious we shall be in a position to take some action.

As to the abortion business, I have long held that the section of the Penal Code which refers to that subject should be repealed. It is a dead letter anyhow. Even in the most flagrant cases, acquittal by jury is certain. Furthermore, as long as the human species continues its hypocritical stand toward women who bear children out of wedlock while condoning every form of immorality (beautifully satirized by Brieux in his "Maternité") and married women refuse to bear children, this practise will flourish in spite of most stringent laws.

As a matter of fact, the County Society once had a committee on this subject, which handed in a scathing report—what of it?

So if you will kindly give me some data on the matters you refer to you will

Greatly oblige

Yours very truly,

RATHER ENCOURAGING.

The influence of the JOURNAL outside of our own state is certainly perceptible. Even our advertising pages are read in places remote from our own territory, and not infrequently we receive gratifying evidence of that fact. Some time ago we noted that requests for the collection paster had come from a number of different states and also from abroad. Now it is a pleasure to record the fact that from Tennessee and from Ohio have come letters referring to the advertisement of the Physicians' and Surgeons' Telephone Exchange and asking for further information as the scheme seems to be so good that the writers of the letters would like to see it developed in their own communities. We certainly can commend the idea to them, for it is invaluable to those who have learned to use it in San Francisco.

THE WRITING ON THE WALL.

A year or more ago an address was delivered before the San Francisco County Medical Society on some of the sociological problems of the medical profession. These were divided into two classes—problems or diseases entirely within the profession and problems arising in the domain of the laity and affecting the medical profession; it was shown that nearly all the problems of any special import are those entirely within the medical profession. The fact was pointed out that dishonest commission taking and fee-splitting were petty larceny evils entirely within the profession and that they must be cured by physicians themselves or else the public, rapidly being educated to this unlawful traffic, would take hold of the problem and solve it in a less pleasant way than one which we ourselves might devise. It was a singular coincidence, but within three weeks after that address a popular magazine came out with a very strong article on the fee-splitting evil in the medical profession. Now another line has been written and one that is well calculated to make thinking men sit up and take careful notice; Wisconsin has passed a law making fee-splitting illegal and punishable by fine or imprisonment. It indicates that the community-control idea has taken definite shape and has crystallized in at least one state. In another state a bill was introduced making it punishable if a physician or surgeon took out an appendix that could not be shown to be diseased; in another state a bill was introduced prohibiting any one from doing surgery unless he had had special surgical training duly certified to. The health and the lives of the people are the most valuable asset of a community and communities are slowly but surely waking up to that fact. The only way that a community can, to its best advantage, secure the best possible sanitary control and medical and surgical treatment for its people, is to control those who are permitted to administer sanitary measures and to treat the sick or afflicted. It is the natural and logical outcome of the development of the civilization idea; it is just the reverse of the 4000 B. C. idea, which permitted any one to do as he pleased but fined quite heavily the man who undertook to do surgical work and failed. What can we do to direct this movement into right channels and to see that it is hastened in a proper manner and not wrongly directed or hampered? It is a big problem and it may be generations before it is settled. Can we not help it along somewhat by trying to correct some of the evils within our own ranks? Can we not take hold of this fee-splitting disease and eradicate it? Can we not do something, by careful thought and honest endeavor, to remedy the clinic and hospital disease and cure the lodge and "dollar-a-month" evils? These are questions well worth the careful thought and study of our county units, for they must be corrected from within or they will be unpleasantly corrected from without!

ORIGINAL ARTICLES

EXPERIENCE WITH ARTIFICIAL PNEUMOTHORAX IN THE TREATMENT OF PULMONARY TUBERCULOSIS.*

By F. FEHLEISEN, M. D., San Francisco,
and
MAX ROTHSCHILD, M. D., San Francisco.

PART I. TECHNIC.

Dr. F. Fehleisen.

It is now over three years since we began to treat selected cases of lung tuberculosis with induced pneumothorax, and 45 patients have been inflated so far in Dr. Rothschild's sanatorium. I would like to make some remarks in regard to the technic.

At the time of our first experiments it was impossible to procure nitrogen-bombs in this city, as they are used in the East and in Europe. We had a simple apparatus made here, as described and illustrated by Brauer and Spengler,* and we have been using it ever since, both for the preparation of the nitrogen and for the inflation. It is the same apparatus originally devised by Murphy, with the addition of a cotton filter for the gas and an air-manometer. This inexpensive and easily extemporized apparatus has given so much satisfaction that I describe it for the benefit of those who have none of the modern and more expensive imported apparatus at their disposal.

* Klinik der Tuberkulose, Vol. xiv, p. 425.

A and B are graduated glass bottles, connected at the bottom by a rubber tube. C is a cotton filter, D a water-manometer and E stopcocks or clamps. Our bottles contain 4000 cc. To prepare the nitrogen we first pour 1000 cc. of a 20% pyrogallic acid solution in bottle B and then 40-50 cc. 20% potassium hydroxyde solution. The openings at the top of bottle B are now closed but the rubber tube connecting A and B is left open and some pyrogallic acid solution is poured into bottle A. In 24 hours bottle B contains sufficiently pure nitrogen. By filling up bottle A and elevating it we can produce any desired amount of pressure for the nitrogen. The whole apparatus can easily be taken apart and sterilized.

In our first 20 cases we followed the advice of Murphy and Brauer, to expose the pleura for the first inflation by a small incision under local anesthesia and to perforate the pleura with a blunt Salomon needle. This gave good results. Our incisions healed under a small dressing with adhesive plaster by p. i. and the patients did not have the slightest inconvenience after the operation. Later on we used a sharp needle without incision, not because we had any bad results from the incision, but simply because we found it unnecessary in the majority of cases.

The object of the incision, as still advocated by Brauer and his school, is to eliminate the possibility of injuring the lung and the danger of air embolism.

The combined experience of Forlanini and many other well-known men prove conclusively that a properly constructed sharp needle does not injure the lung, when it enters the free pleural cavity. In the presence of adhesions it may, of course, enter into the lung tissue, but then it does no harm. The experienced operator feels distinctly the resistance of the costal pleura and the needle will not be pushed beyond it more than a few millimeters. This causes no hemorrhage, and infection of the pleura from the lung is impossible when the lung is adherent to the costal pleura. The needle is taken out, in this case, and reinserted in another place where we hope to find no adhesions, and it is a great advantage that we can search the surface of the lung systematically for a suitable place for the inflation without much loss of time when we use a sharp needle without incision.

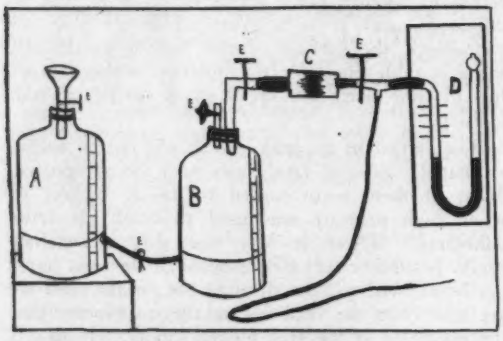
The danger of air embolism should not be underestimated. Several fatal cases have been reported. Most of them were caused by faulty technic or when high pressure was used to break up dense adhesions. There is only one way to exclude every possibility of air embolism: the gas must not be allowed to flow through the needle until we are sure from the readings on the manometer that the needle is in the free pleural cavity. If this is the case, the manometer shows constant negative pressure and the characteristic respiratory oscillations. The negative pressure during deep inspiration may be 8-10 cent. water; if a considerable part of the pleural cavity is obliterated by adhesions it is lower. But always we have constant negative pressure and respiratory oscillations of several cent. water in the pleural cavity. This is not the case if the needle has punctured the lung or when it is extrapleural between costal pleura and endothoracic fascia. In the latter case we have usually slight + — oscillations of the manometer. Should the needle have entered a bronchus, then, of course, we have + pressure during expiration, and same would be the case if the needle should be in the lumen of a vein.

As soon as the correct position of the needle is ascertained, the connection with the gas tank is opened and gas is allowed to flow in under low pressure. It is advisable to stop the inflow for a while after 100-200 cc. are injected. If the patient shows no discomfort, 1000 cc. and more can be given at the first inflation. In many cases we must be content to inject a few hundred cc. on the first day or even less. It is better not to use very high pressure at the first inflation. Later on as much as 25 or 30 c. water pressure can be used in some cases with advantage to loosen adhesions.

I have been asked several times by colleagues what to do when no free pleural cavity can be found after repeated punctures. Even such cases are not hopeless, but the operation is more difficult and sometimes not entirely without danger. The manometer does not show when the needle passes the pleura; you have to rely on your sense of touch. If doubtful, I would make an incision in such exceptional cases. Here Brauer's method may be of advantage even to the experienced operator. As soon as one is convinced that the position of the needle is correct, gas is injected in small quantities, few cc. at a time. Forlanini com-

* Read before the Forty-third Annual Meeting of the Medical Society, State of California, Oakland, April, 1913.

presses the rubber tube near the needle with the fingers, thus forcing in a little gas; others use a syringe filled with nitrogen or oxygen to break the adhesions, but not more than 3 or 4 cc. should be injected at a time. Such small quantities, if injected slowly, would not cause death, even if injected into a vein. After each injection the patient must be watched carefully for a minute or two. If he shows difficulty in breathing, if the pulse becomes frequent, irregular or weak, if the patient



complains of pains or a feeling of oppression or shows other symptoms of embolism or shock from pleural reflexes, then the position of the needle has to be changed or better the operation is postponed.

Holmgren injects in such cases 50-100 cc. normal salt solution before injecting gas. If the salt solution is injected too deep—into the lung tissue—then it causes coughing and sometimes expectoration with salty taste. Fortunately such cases are exceptional. Forlanini has repeatedly stated that the classical cases for gas-compression are those where at least a small part of the pleural cavity is still free from adhesions. Here the inflation, under proper precautions, is almost entirely free from danger and undoubtedly of great value.

Dr. Rothschild's report will show you the favorable results obtained in his clinic, from which I believe we can recommend this method for more general use.

PART II.

Effects of and Indications for Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis.

Dr. Max Rothschild.

The great and general interest which has been aroused in the treatment of pulmonary tuberculosis by artificial pneumothorax warrants a short review of the indications for this treatment, and the discussion of some of its interesting points.

At the State Medical Meeting in Santa Barbara in 1910, and also at the meeting of the American Medical Association in Los Angeles in 1911, I had the honor to present a paper on this subject. At that time the treatment was discussed only in regard to its efficiency in cases of severe hemoptysis, but I had already treated a number of cases which had acute septic tubercular process of one side without hemoptysis, by this same method. The first patients were treated by Dr. Fehleisen and myself about three and a half years ago. Some were cases of hemoptysis and some were cases of one-sided tuberculosis with cavity formation. Since that time forty-four patients have been treated by lung compression and the results have been most satisfactory. In three cases it has been impossible to get into the pleural cavity on account of severe adhesions, and in spite of the fact that otherwise they seemed to be classical cases for Forlanini's method, the operation had to be given up. One case of severe hemorrhage died of miliary tuberculosis about six weeks after the first inflation. Four cases discontinued the treatment before they were advised to do so. In three cases the other side showed signs of progressive tuberculous processes, and treatment had to be stopped on that account. In the other thirty-three cases the results were good. I feel sure these thirty-three cases would have died if the artificial pneumothorax had not been applied.

Before discussing the indications for pneumothorax it might be well to say a few words in regard to the method itself and the logic of its application. One of the most important factors in the treatment of any diseased organ is rest, and recognizing this, we know that tuberculous patients will do a great deal better when kept quietly in bed than if allowed to walk about. Some authorities have tried to enforce this principle by strapping the diseased side, but since the introduction of artificial pneumothorax by Forlanini, it has been possible to compress the diseased lung to such an extent that the breathing is practically stopped.

As Dr. Fehleisen has stated, the operation is a very simple one; the only real difficulty in some cases consists in finding the proper site for the first introduction of the gas. Many cases of tuberculosis of the lungs are complicated by pleuritic adhesions, and a satisfactory compression is only possible when the lung is free. But if these conditions are favorable and the proper place for the first operation is chosen, the method is easily applied and a very complete compression of the diseased lung can be obtained.

Now, as to indications and effects of complete lung compression. First: As mentioned before, it puts the diseased lung entirely out of commission and gives the organ as perfect a rest as is possible. Second: In the majority of cases, it prevents through compression of the lymphatic ducts, an absorption of toxins, and consequently we get in practically all fever cases, a normal temperature one or two days after the compression of the diseased lung. Third: In hemoptysis it compresses the bleeding blood vessel and thus stops the hemorrhage very promptly. Fourth: In cavity formation it brings the walls of the cavities—if they are not too large—together and makes a status curandi possible, which otherwise, through the slow process of granulation, would take many a week or month to achieve; and again, as a result of the compression of this cavity formation, almost immediately after the operation cough and amount of sputum decrease very considerably.

These four features, rest of the diseased lung,

compression of the lymphatic ducts, compression of bleeding blood vessels, and compression of existing cavities are logical deductions. As an effect of these, we see usually a very marked improvement in the general condition of the patient, and after the uncertainty of the first operation is over, most patients are very anxious to have the inflations continued.

I do not want to tire you with any lengthy histories of cases because one resembles another very much. The description of one case will be sufficient to illustrate the great possibilities of the method. The patient, Joseph L. V., 27 years old, was referred to me by Dr. Moffitt in September, 1911. He had had a severe cold for three months, with cough and expectoration, and had lost 49 pounds. He had had a hemorrhage two weeks previous and another one week previous to admission to our sanatorium. Examination showed harsh and prolonged breathing with a few rales in the right upper lobe; bronchial breathing with a great many rales in the left upper lobe; a pleuritic rub in the front and back of the left lower lobe, and a small cavity the size of a walnut in the second intercostal space in the left upper lobe. When the patient entered the sanatorium he weighed 143 pounds, had blood in his sputum, and his pulse varied from 90 to 120, and his temperature from 97 to 101½. The right lung cleared up under rest and the usual treatment, but the amount of sputum did not decrease very much, nor did his temperature become normal during three months' treatment. Therefore, as the right lung was in good condition, it was decided to use artificial pneumothorax. On December 10th the patient had a hemorrhage and his temperature went as high as 101 4/10, and remained high until December 14th, when the first inflation was done. At the beginning the water manometer showed a pressure of 4½; 1050 c. c. of nitrogen were used for the first inflation, as the patient is tall and has a large chest. The next day his temperature was normal, and the sputum had decreased from eight to two ounces. Since then the patient has been treated in the usual way and his temperature has remained normal. On the date of the operation the weight was 150 pounds. Since then the patient has gained continually, and at the date of discharge from the sanatorium, May 27, 1912, the weight was 182½. Since the first inflation the patient has been free from fever, has had no hemorrhages, sputum and cough have disappeared and he has gained 31½ pounds in weight. The left lung was kept under compression until October, 1912. The patient at present is feeling fine, looks the picture of health, and has accepted a position as collector for a life insurance company, which work he can very easily do. So far he has shown no signs of renewed tuberculous activity in the lung.

This case is extremely interesting and instructive, and is one of the best examples one could possibly find to prove the efficacy of the artificial pneumothorax. The patient had been at the sanatorium for three months without any improvement whatsoever in the left lung; he had millions of tubercle bacilli in the sputum; the amount of sputum was seven to eight ounces in 24 hours; the prognosis was bad and had been bad from the beginning, according to the opinion of both Dr. Moffitt and myself. Fortunately the right lung improved to such an extent that it was considered safe to produce the artificial pneumothorax. The change from the day of the first inflation was so marked and the improvement so rapid and so continuous that the history of the case speaks for itself.

We see in this case an excellent illustration of the four features I have mentioned as the logical results of artificial pneumothorax: rest of the diseased lung, compression of the lymphatic ducts and the disappearance of fever, compression of the bleeding blood vessels with the disappearance of hemorrhages, compression of a cavity with diminishing cough and expectoration.

The X-ray in this case showed a complete compression of the left lung six weeks after the first inflation. This harmonized with the findings on percussion and auscultation. I want to say here, a few words about the value of the X-ray. In nearly all publications on this subject one finds that the examination with Roentgen Rays before and after the inflation, is considered of great importance. We have used the X-ray in many of our cases, through the kind assistance of Dr. Freytag; but personally, I see no great value in the X-ray in this kind of work. It cannot show us anything more than we should be able to find through careful physical examination. The only exceptions are those rare cases in which a hemorrhage is the first symptom of tuberculosis, and in which it is sometimes hard to determine the location of the bleeding focus; here the X-ray is undoubtedly of great help. In all other cases I fail to see its great importance, and I cannot understand why all authorities in their publications state that the X-ray should of course be used during treatment with artificial pneumothorax. Most patients who are suffering from a one-sided tuberculosis, usually show a slight infection in the other side, but if this is so slight that it cannot be found by auscultation and percussion, it need not be considered as a contra-indication for the inflation.

In regard to the indications for the artificial pneumothorax, I must admit that I have changed my view from that which I expressed in 1911 before the American Medical Association in Los Angeles. My experience since then results in the following deduction: It is well worth while to try an artificial pneumothorax in all one-sided cases of tuberculosis in which no improvement seems to take place under the ordinary treatment, and in which the inflation is possible, that is, where the adhesions are not so extensive that they prevent an inflation and compression. If the patient shows signs of improvement under the treatment with artificial pneumothorax, keep it up; if not, do not reinflate. The same principle should be followed in regard to the other side—in case this should be slightly affected. If it should improve through the increased aeration, which the compression of the other side necessitates, keep up the artificial pneumothorax on the bad side; if it should get worse, interrupt the treatment. X-rays, as men-

tioned before, will not help much and are often hard to use continually The proper physical examination in connection with careful clinical observation has been sufficient in all our cases to guide us correctly.

In conclusion, I want to say that I admit that while all thirty-three cases so far have progressed satisfactorily, this does not insure complete recovery. Some of them may have to be observed a great deal longer before a complete recovery can safely be accepted. But one fact is certain, namely, that the great majority of these cases would surely have died by this time without artificial pneumothorax. And if the more optimistic of us should be disappointed in getting the ultimate results which we hope to get, even the less optimistic observers of this method must admit that the relief and perhaps only temporary improvement it might provide, in properly selected cases, justifies an important place for this method in our therapeutic armamentarium in the treatment of tuberculosis—a fact which I accentuated years ago, but which, unfortunately, has taken a rather long time for some specialists in this field to realize.

PRIMARY INFECTION WITH TUBERCLE BACILLI, WITH SPECIAL REFERENCE TO THORACIC GLANDS.*

By PHILIP KING BROWN, M. D., San Francisco.

In this study of the probably commonest mode of entrance of tubercle bacilli into the human body, in which I am trying to show that the tracheobronchial glands are in most instances the seat of the initial lesions and the means of dissemination of the tuberculous process to the lungs in most cases, four lines of investigation have been carried on.

I. (a) A study of the reports of autopsies on children dying of tuberculosis.

(b) A study of the location of the lesions of obsolete tuberculosis from 3000 autopsy records of the Mass. Gen. Hosp. (Drs. J. H. Wright, Oscar Richardson).

II. U. S. Meat Inspectors' reports showing frequency and location of tuberculosis in hogs.

III. (a) Instantaneous X-ray plates of 200 cases of clinically early lung tuberculosis in young women.

(b) Clinical examination and X-ray plates of 15 children of markedly tuberculous parents.

(c) Review of X-ray interpretation of plates in 98 cases of clinically doubtful pulmonary tuberculosis. (Mass. Gen. Hosp., X-ray Dept. Drs. Dodd and Holmes, Jan. 1, 1913, to May 1, 1913.)

(d) X-ray interpretation in 29 cases sent for plates where gland tuberculosis was suspected. (Mass. Gen. Hosp., X-ray records.)

IV. (a) Review of experimental data with reference to v. Behring's theory of ascending infection through lymph channels from intestinal lesions.

(b) Experiments with the dissemination of dead carbolfuschin stained tubercle bacilli injected into rabbits in

(1) lateral ear vein showing characteristic lung lesions;

(2) loose tissue around cervical glands;

(3) right foreleg;

(4) intraperitoneally.

I. Karlson,[1] who reports the examination of 15,219 children of school age, found—

Signs of lung tuberculosis in.....	1.6 %
Suspicious signs of lung tuberculosis in..	2.2 %
Bone and joint tuberculosis in.....	0.57%
Enlarged glands in.....	65. %
Presumably tuberculous glands in..	10 to 30. %

Escherich[2] from a clinical and anatomical study concludes that in aerogenous tuberculosis of the lung with walling off and caseation of bronchial lymph glands and terminal rupture into the blood stream or bronchus, we have the typical and characteristic course of tuberculosis of infancy.

Ghon[7] on the other hand regards aerogenous lesions of the lung tissue itself as primary and the most frequent source of the disease, and in 184 autopsies on children with lung tuberculosis he thought the lung lesions showed a more advanced state than the glands and held that the fan-like arrangement of the lesions suggested a spread from the pulmonary focus to the hilus as the course of the lymph stream was in that direction. An hematogenous route he excluded because in 85% of the cases only one lesion was found instead of the multiple ones usual in metastatic processes.

These observers present facts and suggest interpretations that are not altogether in accord, and indicate a variance in opinion regarding the entrance of tuberculosis into the human body and its spread. It is generally recognized that moist or dry particles of tuberculous matter contained in the inspired air are stopped in the trachea and large bronchi, and may pass through the uninjured and intact wall into the lymphatics and be deposited in the glands. The frequency which will be shown of gland involvement as compared to any or all other primary lesions makes pertinent the suggestion that lymphatic defense is occasionally overcome either through massive invasion or diminished resistance, and in fact the lymphatic defense once sufficiently overcome may lead to its actual participation in the invasion. The massive tubercular pneumonias from rupture of glands into bronchi and the hematogenous route in miliary tuberculosis of the lung alone are due to this cause.

There remains still the vast majority of cases of pulmonary tuberculosis which present a picture of exceedingly mild trouble seemingly localized in a small area. Many of the extensive involvements also have been so insiduous in their course and progress as to suggest an exceedingly insignificant beginning. It is an explanation of the beginning and progress of this type of the disease that is attempted in this paper.

Allbrecht[3] in 2000 autopsies on children reports 6% of primary tuberculosis in the intestinal tract and glands, whereas a "great majority" were primary in the lung. In no case was the cervical lymph gland tuberculous without tuberculosis of lungs or tracheo-bronchial glands.

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* Read before the Forty-third Annual Meeting of the Medical Society, State of California, Oakland, April, 1913.

Wollstein [4] from N. Y. Babies' Hosp. material says, "even in childhood the respiratory tract is more frequently the entrance point than is the digestive, and in 185 cases there was no case of mesenteric lymph gland involvement as the only tuberculous lesion in the body."

Medin [5] in 595 autopsies on tuberculous infants under 1 year found only 6 cases of primary intestinal tuberculosis while 273 involved the lungs and bronchial nodes alone.

Comby [9] in 1432 autopsies on children found tuberculosis in 529 cases, the peri-bronchial glands being constantly involved. He claims that these glands represent the aerial port of entry of the Koch bacillus. He has never observed primary tuberculosis of the intestines.

White and Carpenter, reporting their experience in the Children's Hospital in Philadelphia on pulmonary cavities in infants state "in infants dying of tuberculosis the lungs were involved in 100% of the cases." Osler quotes the New York Foundling Hospital statistics, where in 125 autopsies the bronchial gland were tuberculous in every instance.

Shennan [10] in a report of the Royal Edinburgh Hospital for children material of 413 autopsies on tuberculous children says "from the standpoint of dissemination of tuberculosis throughout the body, the thoracic gland tuberculosis is the more important and common" (as compared to other sources, especially abdominal tuberculosis). "Dissemination had taken place in most cases apparently from caseous lymphatic glands, principally of the mediastinal group." Shennan lays repeated emphasis on this mode of dissemination and the fact that these glands are involved frequently without tuberculosis of the lungs (33 in 281 cases).

The autopsy records of the Mass. Gen'l. Hosp.[17] give fairly complete data regarding obsolete tuberculosis and in tabulating the 3000 records by hundreds and striking an average where for certain periods no mention is made of glands, it develops that as far as mention of tuberculosis goes the lungs alone were involved.....156 times
bronchial glands alone.....600 times
mesenteric glands alone..... 69 times
bowel alone..... 5 times

It is obvious that absolute data could only be obtained where in making the autopsies special reference to this point was made. However, the point is clear enough that upon microscopic examination the glands are involved alone about four times more frequently than the lung. If one considers the point emphasized by Rabinowitch's [16] review of the literature on latent infection of the glands determined by animal inoculation, it is probable that the relation of primary tracheo-bronchial gland tuberculosis to primary lung tuberculosis would be nearer 8 to 1.

II. *Evidence of Primary Involvement of Glands, Particularly of Thorax in Animals.* The Bureau of Animal Industry, Washington, D. C., reports [15] that on consulting files of post-mortem reports, which are filled at the close of each day's work at all abattoirs having federal inspection, it developed that of 1237 tuberculous cattle, 155 were affected in the cervical glands only, 533 in cervical and thoracic glands only, 124 in cervical and thoracic glands and also in the lungs. The mesenteric glands alone were tuberculous in 4 instances, the mesenteric and thoracic glands in 115 cases, and there were 306 cases of generalized tuberculosis.

These reports of tuberculous cattle were from various parts of the country, being compiled from the records in cities in six different states.

Ryder,[13] in charge of the Boston station of the Bureau, has made a careful post-mortem examination of 59,460 hogs, of which number 50 carcasses showed lesions of the gastro-hepatic glands and of the bronchial glands. "In fact our study of the lesions of hog tuberculosis shows that next in the order of frequency to the submaxillary gland infection comes the combination of the submaxillary with the bronchial glands, then the sub-maxillary, bronchial and gastro-hepatic glands, next the submaxillary, bronchial and gastro-hepatic glands, and the liver."

In a certain small number of cases infection probably occurs directly through the respiratory tract, but these instances are extremely rare.

"The disease in hogs is essentially produced by ingestion, therefore the glands and tissues associated with the digestive tract are the most frequent seats of infection. Indeed, the superior cervical glands (in almost all cases the submaxillary gland), are nearly always affected, as at the post-mortem examinations held by the bureau inspectors over a consecutive period on 120,000 hog carcasses, 93.3% were found to contain lesions in these glands. The large tonsils and the large number of lymph sinuses in the lymph glands probably account for the frequency. *Next in importance are the bronchial glands of which 27.2% were diseased,* while the gastro-hepatic chain of glands was involved in 21.6% of the cases. In all these cases the lesions may involve the entire lymph structure, or only the central or several irregular points, and may be either caseous, calcareous or caseo-calcareous. The mesenteric lymph glands showed lesions in 18.1% of the carcasses examined. The liver was affected in 9.2 of the cases. The lungs are the next tissue to be most frequently affected, as it is represented by 7% of the carcasses above recorded. The morbid anatomy of the lungs in this disease simulates that observed in human tuberculosis more than in cattle tuberculosis. In fact, the disease bears many points of similarity to infantile tuberculosis in the human. There may be tuberculosis pneumonia involving large areas of the lungs, causing collapse of the marginal portion. There may be irregular sized grayish or yellowish areas of caseation, as is so often seen in cattle, but not infrequently there are observed large areas of miliary gray or translucent foci, showing evidence of generalization as a result of the bacilli being disseminated by the blood stream."

The chief point in these abstracts from Ryder's article is that the lungs are involved in 7% of cases whereas the bronchial glands are involved in 27.2%.

It is thus shown conclusively in childhood, in adult life and in the animals most commonly afflicted with tuberculosis that the usual primary lesions are in the chest glands and not in the lung. This being the case what is the connection between tuberculosis of these glands and lung tuberculosis? To deny direct aerogenous infection of the lung subsequent extension along lymphatics or bronchi is not at all suggested. Early lung lesions, however, do not indicate that this is the commonest way, but rather that there is a retrograde infection along the lymphatics from tubercular disease of the root glands.

III. *Evidence from X-ray Examinations of Extension of Lung Tuberculosis from Hilus Glands.* The evidence presented by instantaneous X-ray plates suggests exactly what is shown at autopsy in children and in the obsolete tuberculosis in adults —namely that enlarged glands in the hilus are vastly more common than supposed and in the absence of physical and X-ray signs of *lung* tuberculosis, this condition must account for the relative frequency of skin and subcutaneous tuberculin reaction. Indeed it is a common condition in children and adults with positive tuberculin reactions and negative findings to auscultation and percussion, that the hilus glands are found involved on X-ray examination. It may be suggested that the subsequent or concurrent lung involvement is due to independent direct aerogenous lung infection, but in answer to this the lung in that case would not be involved so constantly in the direct path of what X-ray shows to be the extending infection outward along the lymphatics.

IIIa. The X-ray plates made by Dr. Anna Davenport of all the applicants for admission to Arequipa Sanatorium for early cases of tuberculosis in women, together with a number of private cases in women, were made a basis for the study of hilus gland tuberculosis and their possible relation to the lung process. In a series of over 200 plates of early cases about one-half presented striking evidence of a V-shaped segment of lung in which the linear markings were thicker than elsewhere in the lung and were described as mottled, nodular or beaded. The distal portion showed diffusely increased shadow in some cases or definite more or less plain nodes, often in groups, but sometimes single. Occasionally such nodes, more marked than the beaded appearance, occurred somewhere between the hilus and the periphery, emphasizing the greater development of the process at those points as it extended. But most significant was the frequent occurrence of nodular outlines in the hilus of the affected side and generally in that part of the hilus from which the thickened linear markings emerged. From these hilus nodules extending toward the periphery at short intervals or apparently in chains were progressively smaller nodules suggesting nothing more plainly than direct extension outward. In a few cases large mediastinal glands could be seen protruding their shadows from that cast by spinal column and sternum. In one such case an abscess of the root extending outward from a group of very large glands seemed due to the breaking down of one gland and the dense V-shaped shadow extending out from the root to the axilla suggested a tubercular pneumonia from acute and intense diffusion, such as might have occurred had one of the larger secondary bronchi been invaded by the abscess discharge. The clinical signs were insignificant at first compared to the X-ray picture but increased rapidly in intensity as the periphery of the lung was invaded. Localized Miliary tuberculosis and processes which we describe as tubercular pneumonias probably all arise in this way. General miliary tuberculosis, of course, arises through the blood stream, but when it is localized in one lobe or part of one lobe it is always a segment with its apex at the hilus and it cannot well be accounted for in any other way than by extension along a bronchus or rupture into an afferent blood vessel. But bronchial and blood vessel extensions are not the common method of spread of the disease in the early stages, for we find in early cases far more frequently the hilus glands enlarged and a beaded chain of glands smaller as they extend outwards and connected by thickened shadows of the bronchial tree.

Argument against extension in the reverse direction of lymph stream does not seem to stand in face of the repeated instances of infection against definite currents,—for example ascending infection of the pelvis of the kidney, pleuritis at the right base behind in acute appendicitis and pleuritis peripheral to a lung cavity where there is microscopically healthy lung between cavity and pleura.

So much detail is lost in reproducing X-ray plates for illustration that I have omitted them. To illustrate diagramatically as Ghon [7] has done, is not to strengthen the case, since my observations are exactly the opposite of his, nor in contending for the primary involvement of the lung and secondary of glands does he explain why these very glands in children, in obsolete tuberculosis in adults, and in animals are involved 4 to 6 times more frequently than are the lungs.

IIIb. Fifteen children of known tuberculous parentage reacting to skin tests but with no other definite signs of lung tuberculosis were X-rayed, and in every one there were enlarged hilus glands in distinct contrast to 16 children in the same families who showed neither hilus glands nor skin reaction.

Both of these groups seem very important, for they indicate a marked dependence of the clinicians on the X-ray findings in doubtful cases and a growing appreciation of the possible presence of deep-seated lesions in cases where ordinary lung examinations are negative. That there is a noticeable connection between hilus gland enlargement and lung shadows is evident by the interpretations of the radiographer, and in conversation with Dr. Holmes of the X-ray department of the Mass. Gen'l. Hospital he expressed himself positively in two particulars, that the glands are involved first and the extension is outward, and that the extension must very often be along the

lymph channels causing the thickening since neither blood vessels or bronchi are thickened in early processes.

IIIc. From Jan. 1 to May 1 Drs. Walter Dodd and Holmes (Mass. Gen'l. Hosp. X-ray dept.), have made 98 plates of chests of patients suspected clinically of having early pulmonary tuberculosis. The X-ray interpretations are as follows:

Lungs definitely involved	46
Doubtful	12
Negative	1
Lungs involved, peribronchial glands enlarged	9
Lungs involved, glands enlarged, markings thickened	12
Lungs involved, glands not mentioned, linear markings noted as thickened or studded	8
Lungs not diagnosed tubercular, but glands enlarged and markings thickened	10
	98

There were 19 cases on record since Jan. 1st, 1913, where involvement of the thoracic glands was in question clinically. The X-ray interpretations were as follows:

Lung alone involved	0
Glands alone involved	8
Glands and thickened markings	4
Glands and lungs involved and thickened	7
	19

Jordan, radiographer of Guy's Hospital reported recently on the X-ray findings of 150 consecutive plates of cases of clinically positive tuberculosis with bacilli in the sputum. X-ray showed:

Purely apical tuberculosis	32
Confined to roots	59
Apex and root on one or both sides	59
	150

He adds that the apices of the lower lobes are included in the enumeration.

IIId. Localized miliary involvement of the lung can be explained only on the ground of rupture of a softened focus with an afferent vessel or bronchus. That the latter occurs we know, but the rupture into blood vessels without signs of hemorrhage is hard to understand.

Occasionally in obsolete tuberculosis of the lung a healed nod of air born infection one can only surmise. They are not common and not easily accounted for.

The extension of the studded and thickened linear markings to all the definite peripheral lesions in a given case, and even to areas adjacent to seats of definite lung involvement, suggests constantly afferent and not efferent spread of infection, in the latter case the markings would show from the obvious lesions to the hilus glands only. This is not the case, however, for the markings with the nodular thickenings frequently proceed to no definite lesions, and where they do so proceed they seem to be disseminated to neighboring parts as well. Frequently the most peripheral early lesions are the most advanced, but in every such case it is a matter of note that the lesions are just below the pleura as if the bacilli had been carried rapidly as far as they could be, and there had made their stand.

IV. *Experimental Dissemination.* Of the light thrown on the subject of modes of entrance and dissemination of tubercle bacilli in the human body through experiments on animals, not much can be said.

An ascending infection of the lungs from lesions in the bowel and mesenteric glands was suggested by Von Behring and the case was well presented by Harbitz,[11] who reviewed the literature on this subject and established the point. Tracing out the course of the infection has been tried by the injection of various pigments, chiefly blue, china black and cochineal into the gut or peritoneum. No very striking results have been obtained (19, 20). Calmette found results of peritoneal injections of insoluble substances in young animals always negative, and so many old animals have acquired a lung anthracosis that results are not easily interpreted. Mace tried talc and recovered it by chemical test, but got negative results.

Bacilli have been fed to animals even through a tube and have been introduced into the stomachs of animals through operative wounds, but no results of the details of the spread have been obtained. Ravenel showed that the bacilli did reach the lung. Even a few hours after injection or feeding live bacilli to rabbits he removed the lungs, mascerated them and injected a part into animals, thereby producing a tuberculosis. This does not show us how the extension goes on. It is obvious, however, that if the lungs are infected rapidly, the infection must spread directly through normal channels of lymphatics and reach the circulation.

To meet the problems involved a number of experiments were undertaken on rabbits into whom were injected dried dead tubercle bacilli stained with carbolfuchsin washed in weak acid alcohol and repeatedly in salt solution and then ground up as fine as possible in a mortar. They showed a decided tendency to clump and grinding was necessary on that account.

Injections were made into the lateral ear vein in order to show the type of lesions that would be made in the lung, then into the region of the cervical glands, the right fore leg and the peritoneal cavity. Injections were repeated daily for four days.

The results of the experiments will be reported in detail later. So far they promise to mark out certain channels very well, but the tendency to local abscess formation is a serious handicap. Less frequent and less massive injections promise better results.

CONCLUSIONS.

In man and commonly susceptible animals the tracheo bronchial and hilus glands are the commonest seat of definite tuberculosis.

They are involved about four times more commonly than the lungs.

This fact fits in with evidence of X-ray plates in early cases of extension outward:

Through rupture of caseous glands into bronchus, making caseous tubercular broncho pneumonia.

Through afferent blood vessels causing localized miliary lesions.

Through rupture of, or extension from caseous glands into lymphatics, making common type of mild local lesions which like areogenous infection of lung tissue respond relatively easily to treatment.

Ascending infection from abdominal lesions play a definite but small role.

Animal experiment on mode of diffusion of tubercle bacilli are not yet satisfactory.

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Discussion.

Dr. W. C. Voorsanger, San Francisco: It is rather difficult to discuss three such comprehensive papers in five minutes! To briefly discuss those of Dr. Brown and Dr. Crosby, they have emphasized a fact recognized for many years, and one looking toward the prevention of the spread of tuberculosis. About seven years ago Dr. Lehman and myself published a paper on the use of the X-ray in early cases of tuberculosis. At that time the X-ray was not as well understood as to-day, but we were able to trace very often the tuberculous process as originating in the lung hilus. I think the spread of tuberculosis from the bronchial or peribronchial glands is a well established fact, and in the tuberculosis clinic in San Francisco we make it a matter of routine to examine members of the family of any patient who has tuberculosis. We have about 400 cases of tuberculosis under observation and every member of their families has been examined where possible. We hear a great deal about the spread of tuberculosis from the peribronchial glands, but nothing is said about the care of the young children with enlarged glands. I have treated them almost as incipient cases of tuberculosis. Besides the hygienic treatment, minute doses of tuberculin are given for three or four years.

Regarding the artificial pneumothorax. I was particularly interested in the number of cases because, if we are going to follow what has been taught by men who have done a great deal of that work in the last few years, we must realize that the number of cases available for artificial pneumothorax is necessarily small. Forlanini has been able to report on 163 cases. Brauer two years ago, in conjunction with Spengler reported 101 cases and probably to-day has added but 25 cases to that number. Only a few months ago I saw Brauer work. He is very inspiring, and when you see him work you think his method is the only one. But after you have seen a few men work with the Forlanini method, you are not so sure that you want to use Brauer's method. The technic of the operation, as has been said, is simple. It makes little difference what the shape of your cylinders are if they contain nitrogen—it is important, however, that you should know how to read the manometer. To facilitate the operation, I think it is a good idea to get a tank of nitrogen. The important part is the indication. I do not believe we should choose our cases lightly, because recently it has been shown that a lung which has been compressed does not regenerate as well as one which has not. The experiments of Kaufman on animals show that the lung is so changed that it is almost impossible for it to regenerate into healthy tissue.

Dr. W. V. Brem, Los Angeles: Dr. Brown indicated the difficulty of determining whether the progress of the infection is from the glands to the lungs or from the lungs to the glands. I do not think the X-ray lends itself to the study of this particular problem. Dr. Brown cited the Edinburgh autopsies and said that in 30% of gland involvements there was no lung involvement, but he did not state what percentage of bodies with lung involvement showed no involvement of the glands. Some years ago I published statistics of 287 autopsies, studied with special reference to microscopic evidences of tuberculosis. Seventy-four per cent. of the bodies showed tuberculous lesions. The peribronchial glands were involved in about 30%, the lungs in about 60%. In about 30% of the glandular involvements there was no lung involvement, and in 40 to 50% of the lung involvements there was no glandular lesion. It is probable that each can be involved directly, without the bacilli passing through the other. On the other hand, it is conceivable that the bacilli may pass through the lungs to the glands or through the glands to the lungs without producing macroscopic lesions. Calmette in France, and Ravennel in this country, think that a great percentage of infections are of gastrointestinal origin and leave no trace of the route of infection. Harbitz and others, using glands showing no macroscopic evidence of tuberculosis, have produced tuberculosis in guinea pigs. Von Behring and Römer think that the ability of the adult to localize tuberculous infections and prevent them from becoming generalized is dependent upon an immunity acquired from an infection early in life that often leaves no trace of itself.

It seems altogether plausible, therefore, that bacilli can pass either way, from lungs to glands or glands to lungs, without leaving a trace of their passage through the first organ, but it seems to me probable that the channel of infection coincides with the direction of lymph flow, and that it is from the lungs to the glands.

Dr. Edward von Adelung, Oakland: We are discussing an advanced field of medicine, and therefore my views are rather tentative, having been gathered from a limited experience. I have been led to a position which would endorse Dr. Rothschild's general statements. First, as regards the apparatus—it is really Murphy's of Chicago, and can be put together by anybody. I want to call attention to the manometer. Everyone realizes the importance of having a manometer and knowing how to read it. One question I want to ask

is how to read this manometer—an elementary question. Will one of the readers of the papers tell me how to read this manometer, when the level of the fluid on one side is —5 and the other at +5? Is it 5 or is it 10? My next remark is a suggestion: We can avoid a percentage of pus complications occurring in the pleura by being sure that the gas is sterile. This is easily attained by passing it through hot tubes before using. Furthermore, the gas will be better tolerated if, instead of using plain water in the bottles, we use a bichloride solution, very hot. This insures not only asepsis, but heat and moisture as well. It should be noted in talking about the technic that the manometer will not register if there is any moisture in the needle. It must be clear of blood and water. The next item is that when we produce a pneumothorax of considerable pressure we are likely to get cutaneous emphysema, which in one case I had extended down along the outer edge of the rectus muscle into the scrotum. I suggest that some anatomist study the courses of subcutaneous emphysemas. My personal view regarding the relative value of the Forlanini and Brauer methods is that I prefer the needle method. I have not been convinced that dissection to the pleura has advantages over the needle. I therefore ask my second question: Has the reader run across any cases in which, having failed with the needle, he succeeded by Brauer's method?

Dr. B. F. Howard, Alta: I wish merely to ask a question as to the artificial pneumothorax. It has been suggested that in cases of pleural effusion, the effusion should be withdrawn and the space filled with nitrogen gas. In some cases failure has resulted because of infection. I would like to ask whether, in any of the cases reported, advantage has been taken of this method of replacing serous (pleural) effusion. Of course it has some of the advantages of effusion, which is nature's method of compressing the lung, without some of its disadvantages. I would like to know if Dr. Rothschild or others have successfully accomplished the preservation of this compression by refilling the pleural cavity with gas after having withdrawn the exudate —without in any way complicating the situation.

Dr. F. M. Pottenger, Monrovia: I was especially interested in the first two papers from the standpoint of the importance of latent tuberculosis. We have been too apt to disregard the early symptoms. Latent tuberculosis is not the simple harmless affair that we have been teaching for many years; it deserves just as much attention as latent syphilis. The fact that so many people are infected (80-100% of children are infected before the 14th year, in families where tuberculosis has existed) makes us hesitate to give the serious attention to latent tuberculosis that it deserves. We hesitate to consider a great portion of the population as suffering from so serious a disease. We should not fail, however, to bear in mind the fact of the frequency of infection, and that many of those children who are poorly nourished and show slow development, with lack of endurance, are suffering from this disease. If these children react promptly to tuberculin they should be treated as tuberculous, and I think if we did that we would do much to prevent clinical tuberculosis in the adult. Regarding the route of infection: as far as we know to-day, all we can say is that bacilli may be taken into the body through abrasions of the skin or through the mucous membranes of the respiratory and digestive tract. We know, however, that nearly every child becomes infected before the 15th year. Tubercle bacilli taken in small numbers unquestionably produce immunity toward further inoculation, but sooner or later, so many bacilli are taken in, infection results. The point is to watch these early infections and be sure they heal. I have been much interested in artificial pneumothorax but have not done it. Not that I am opposed to it, but I have obtained good results without compression, and I think the patients treated without it will be better off at the end of five years than if it had been done.

Dr. Daniel Crosby, Oakland: Regarding the question of the X-ray not showing these conditions, it seems to me this is a very hard statement for some of us to accept, because while we find some children who present what the average of radiographers consider normal hilus shadows yet we find a number presenting areas of thickening going out into the normal shadow from the middle of the chest. I want to emphasize the work of Jordan, in which he took 52 lungs passed as non-tuberculous by the pathologist in Guy's Hospital and in which he demonstrated the remains of old healed tubercular pneumonia. The picture helps to show an unbelieving patient his or her variation from normal, and if you are going to deal with tuberculosis in its incipient stage, whether or not there is active tuberculosis, the X-ray is a very helpful means of demonstrating the diagnosis.

Dr. F. Fehleisen, San Francisco: In regard to Dr. von Adelung's question, I want to say that I have mentioned that the apparatus was originally devised by Murphy, but the sketch is taken from Brauer and Spengler's publication. In regard to Dr. von Adelung's second question, it is my belief that the manometer should be read from zero.

Dr. Max Rothschild, San Francisco, closing discussion: In regard to Dr. Voorsanger's remark that tuberculosis in children originates from the bronchial glands, I want to say that this question is by no means solved. Whether the original infection takes place through the air, or blood, or intestinal tract is still open for discussion. Last month George Simon published a most interesting article on this subject in Brauer's Klinik. He seems to think that in all cases of tuberculosis of bronchial or peribronchial glands the primary focus of infection lies in the lung itself and can usually be found in the post-mortem, also often in the X-rays. He bears out the findings of Albrecht, Kuess and Naegeli in this respect.

In regard to artificial pneumothorax, I want to say that in my opinion the number of cases available for this method will increase in time. Reports show that almost all the institutions for the treatment of tuberculosis in the old country which did not use the artificial pneumothorax three or four years ago are now using it—most of them with good results. To give an opinion of any value in regard to a comparatively new method, one should have some personal experience—it is not sufficient to watch some one else, as Dr. Voorsanger did, and then form an opinion. While it is always advisable to be conservative, it is sometimes a mistake to be too much so. At present I do not apply an artificial pneumothorax before the cases in question have been observed at least two to three months. If I see no improvement during this time with the ordinary treatment, and if the cases are otherwise suitable for the method, I try the pneumothorax. One point is an absolute fact, and that is that Forlanini's operation, properly used, cannot do any harm. The nitrogen which is used during the first inflation is usually absorbed in 24 hours. If one notices that the patient seems to feel better during this time or does not feel any worse, the reinflation is indicated. I want to confirm Dr. von Adelung's observation in regard to cutaneous emphysema. It is a common complication, especially in the beginning of the treatment, but does not amount to anything other than giving the patient some slight discomfort for the time being. In regard to Dr. Howard's question about withdrawing pleural effusion and replacing it with nitrogen, I want to state that we have done this in a few cases. I would not do it again. The effusion has practically the same effect as the compression with nitrogen. Referring to Dr. Pot-

tenger's remark about latent tuberculosis, I am glad that he brought up this question. I have been most interested in this subject and have given my views on the same in a paper, "Latent Tuberculosis, Its Symptoms, Treatment and Prognosis," read before the State Medical Society in 1901. It is of the greatest importance to diagnose a tuberculous condition before it becomes really active—if it is possible to do so, and in a great many cases this can be done. If we see children or adults in a weakened or slightly anemic condition, inclined to catch colds very readily and to cough persistently and repeatedly, it is always wise to make a tuberculin injection for diagnostic purposes. The skin tests are not sufficient. If the patient reacts positively to the injection, a treatment with tuberculin might be tried, and it is surprising what excellent results are frequently obtained.

MANAGEMENT OF FRACTURED CHARCOT HIP JOINT.*

By REXWALD BROWN, M. D., Santa Barbara.

This type of clinical picture may present itself. A man seeks the attention of a physician with a history somewhat as follows: Three weeks ago he slipped on the street and fell heavily on to the pavement, or he was thrown roughly against the side of a motor car because of a collision. The accident was seemingly of no moment, for he was able to immediately walk away—he limped considerably, but suffered no pain. During the succeeding days his lameness increased, but he gave little attention to it, as there was no suffering. He has been using crutches for the past three or four days because he stumbled and cannot control his leg well—he thinks his foot is turned out somewhat and leg seems shorter than the other. During the past week the region of the hip has become much swollen, but it has not hurt him. On examination a large, firm swelling is found over the hip anteriorly and posteriorly. There is no tenderness on palpation, and the joint can be moved without causing any pain.

Fracture, dislocation or sarcoma may be thought of; but no, these are always associated with much pain, especially the fractures and dislocations, either immediately at time of injury and upon any movement of the joint. Perhaps the physician is or is not nonplussed for the moment, depending on whether or not he focuses on the dominant note in the picture—*absence of pain*. What does it mean? A neuropathic or Charcot joint, and almost invariably tabetic in nature.

To safeguard his views the physician hastens to inquire regarding a venereal history; he looks for the Rhomberg sign, the Argyle-Robertson pupil, the loss of knee jerks, et cetera, and if still in doubt, a positive Wassermann makes conclusive his diagnosis. Further a skiagram shows a fracture of the neck of the femur.

What is to be done? The condition is certainly a desperate one. An intracapsular fracture is itself a sufficiently difficult matter to handle, a Charcot joint almost invariably tends to progressive destruction of the joint structures, and a tabetic patient is not an altogether favorable risk for surgical attention.

The embryology of joint formation must be known in order to understand the changes in a Charcot joint whatever be their pathogenesis, which is covered by the use of the phrase trophic in nature. In early embryonic life there are no joints. The ends of the young bones are separated by an indifferent mesoblastic connective tissue which extends on either side on to the shafts of the long bones, becoming ultimately the periosteum.

When the joints begin to form this interposed connective tissue transforms into cartilage except externally where it is continuous with that covering the shafts. The cartilage finally divides in the median line and the joint cavity is formed separating the articular surfaces of the two bones. This closed cavity has as its wall or capsule therefore remains of the original mesoblastic connective tissue. Continuous as it is with the periosteum with its definite layer of osteogenetic cells, it is readily comprehended that the joint capsule has the necessary elements in potential to produce bone.

The pathology of a Charcot joint is most frequently that of a rapidly developing hydrathrosis, with subsequent uneven disorganization of cartilage and bone, and enormous irregular ossification of the fibrous layer of the capsule. Often there is marked peri-articular edema and the projection into surrounding muscles of osteophytes from the ossifying capsule. The extent of the destruction which can occur in a hip joint will be cited in the case report to follow. A fracture in a Charcot hip joint assumes any of the usual types of intracapsular fractures in normal joints.

What method of management can best serve a patient who suffers from this complicated and appalling lesion? Attention is given naturally and the usual measures undertaken to limit the development of the tabetic disturbances in the cord. Slow progress of course pertains here, and in the meantime the patient has become a cripple, confined to bed or goes about on crutches. The enlargement about the joint has increased and there is muscular atrophy and stiffness.

Whereas some Charcot joints do not progressively grow worse, but even seem to improve at times, the influences produced by a fracture, however, conduce to continuous metaplasia of the bony and cartilaginous structures. Distortion of the joint appears and is combated by more or less efficient brace support. Further than these methods there has been little of value. Attempts have been made to remedy the condition by open operative procedures such as resection and drainage of the joint. These measures have been productive of no really accepted additions to the treatment.

The ill results were due perhaps to the failure to appreciate that the joint changes would persist as long as the joint structures persisted. That is, regardless of the origin of the destructive forces in a Charcot joint, whether they be in the cord or in the joint itself, the structures on which the forces are expended in the main are the cartilages and the capsule. In the above operations the cartilages

* Read before the Forty-third Annual Meeting of the Medical Society, State of California, Oakland, April, 1913.

or the capsule or both remained, and consequently the osteogenetic and osteoporotic changes continued.

Only comparatively recently has new thought been directed to the management of fractured Charcot hip joints. This thought, largely J. B. Murphy's, has reached back into the embryology of joint formation and has appreciated the significance of the capsule in the pathology. The capsule shorn of its normal functions by the irritation of luetic or other toxine reverts back to its elemental potential function and produces bone.

Then to cure the disease the hip joint must be obliterated—an arthrodesis must be performed. Success is to be gained only by excision of the entire capsule and synovial membrane, complete removal of the cartilage bearing bony structure from the head of the femur and from the acetabulum and cutting away of all excess bone. To secure firm bony union the neck of the femur must be nailed to the acetabulum. The reduction of the fracture and the maintenance of the fragments in apposition is likewise attained by this last step as the nails are driven through the neck in a direct line from the base of the great trochanter.

The steps in the operation are: (a) A large U shaped incision is made over hip with the trochanter in the center of the U. (b) With a chain saw, the trochanter is sawed off downward and outward and then retracted with its attached muscles upward. (c) The obturators and pyriformis muscles are divided and ends transfixed for subsequent approximation. Free access is now had to the joint to permit of the removal of the capsule and cartilages.

This is a serious, technically difficult and laborious operation? Yes. It will never be a routine procedure, as the subjects in which the disaster occurs are frequently in condition not favorable to surgical measures. Yet in many this open treatment may be of great value, and probably particularly so in those comparatively young men in whom a fractured hip followed soon by a Charcot joint may be the initial symptom of tabes. The selection of proper cases for the operation will always require careful thought. If ankylosed joints can be secured, results will be ideal. However, this method of surgical treatment is but in its infancy, and may be greatly modified by reports of future operated cases.

Case Report.—Mr. J. R. D., age 48, referred by Dr. B. Bakewell on July 14, 1912. He has had tabes dorsalis for several years, wears a brace support for a Charcot knee (right), has abdominal crises at intervals. On May 17th he stumbled in a hallway and fell to floor, striking on left hip; was able to walk to room with assistance, has not been out of bed or wheel chair since. He had no pain at time of injury and has had none since.

Examination found left leg 1½ inches shorter than right (not accurate, due to distortion of right knee), and a firm massive enlargement of left hip. There was no pain on manipulation, but considerable limitation of motion. Skiagraph gave no valuable information except that irregular bony mass seemed to extend high toward crest of ileum—no fracture shown or outline of bones.

Condition was explained to patient who was depressed and did not care to live if he could not get about again. He was told that condition in joint was not wholly clear, that only through operation could there be a possibility of his walking, but that his general condition was not favorable to operation. He took the matter under advisement and six weeks later elected to be operated upon. Operation was performed on August 27th. Incision was U shaped—great trochanter could not be found—a thick wall of bone extending from well down on shaft of femur to above acetabular rim was encountered—could not get around it—the adjacent muscles seemed infiltrated with bone. The wall was chiseled through—it was one-half inch thick and it opened into a cavity containing about two quarts of gray colored fluid. The internal wall of the cavity was thick irregular bone, very deeply placed in the inner side of the thigh. More of the outer wall was chiseled away and it was found that an intra-capsular fracture had occurred close to the trochanter and that the lower fragment carrying the trochanter had been displaced upward. This fragment was attached on the inside to the bony wall and when chiseled away could not be displaced downward. The fracture surface was covered with structure resembling cartilage. The upper fragment was displaced inward, was covered almost entirely with a soft cartilaginous material, and appeared almost as if fused into the wall of the capsule. The acetabulum could not be seen, but the sensation given to the fingers was that the head of the femur was softened and displaced on to the rim.

It was impossible to chisel away the bony capsule and remove the cartilage—the upper fragment was chiseled free and cartilage excised, the trochanter and about one-inch of the shaft removed, permitting the two fragments to be brought together, nailed and wired. Wound was closed. Patient regained consciousness, but died a few hours later.

This case is of value in pointing the way to achievement of the ideal result aimed at. Arthrodesis must be done in the very early evolution of a Charcot joint, long before there is much deposit of bone in the capsule.

THE MÉNIÈRE SYMPTOM-COMPLEX. A CLINICAL REVIEW.*

By HILL HASTINGS, M. D., Los Angeles.

I wish to present to you some case-records of labyrinthine affections in which the Ménière symptom-complex occurred, to discuss those of special interest and to invite your discussion of the subject. I regret that I cannot hope to bring before you any new facts, nor do I presume to attempt a classification of non-suppurative labyrinthine affections.

The study of non-suppurative affections of the labyrinth has lagged somewhat in comparison with that of labyrinthitis, secondary to middle-ear suppuration. There are two reasons why this should be true. Firstly, suppuration of the labyrinth has offered a field wherein the clinical findings can often be verified by operation. Secondly, labyrinthine suppuration is not infrequently the cause of death. Autopsies are, therefore, frequently obtained. On the other hand, it is an exceedingly rare event to be able to verify by autopsy one's clinical observations in non-suppurative affections of the labyrinth, death having resulted from other causes remotely related to the ear affection. For these reasons it is incumbent upon us as clinicians to review our past clinical experience, readjust our

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methods of examination in accordance with recent scientific investigations, and thus do what we can to illuminate by clinical experience the still dark portion of the ear. One must often regret that the hidden nerve-field of the ear can not be seen by the otologist as is the fundus of the eye by the ophthalmologist.

I have recently had occasion to review 147 of my own records of non-suppurative cases in which the functional tests showed involvement of the auditory nerve apparatus. Seventy-four cases (about 50 per cent.) were without definite middle-ear signs or symptoms. The remainder, 73 cases, showed signs of labyrinthine deafness classified as follows: In otosclerosis, 37 cases; in chronic catarrhal otitis media, 23 cases; in tuberculosis of the ear, 13 cases. (Tubercular cases are included because the labyrinthine destruction did not follow the usual course found secondary to middle-ear abscess.)

Of the 74 labyrinthine cases (not secondary to middle-ear disease), 20 (27 per cent.) presented Ménière's symptoms. In eight cases the dizzy spells were of the apoplectic form.

The term "Ménière's Disease" has been rather loosely applied. The classical case, reported by Ménière in 1861, served to direct attention to the anatomical seat of a diseased condition that caused a characteristic combination of symptoms—deafness and dizziness, with nausea or vomiting. Ménière's interpretation of his findings in this case has been questioned. The hemorrhagic exudate, which he found in the labyrinth, could not in itself explain the cause of death. The patient, a girl of 18 or 19, died in five days, and the autopsy showed no middle-ear suppuration and no suppurative intracranial lesion. Bezold believed that the case was one, not of hemorrhage in the labyrinth, but of epidemic cerebro-spinal meningitis, with extension to the internal ear—a sporadic case in which the meningeal condition was overlooked. While this is the most plausible explanation of Ménière's case, *the term "Ménière's Disease" has been generally applied to non-suppurative affections of the labyrinth, or auditory nerve apparatus, in which Ménière's symptom-complex occurs. And Ménière restricted the classification to cases in which nerve deafness and not middle-ear deafness is found.*

Cases presenting Ménière's symptom-complex as a rule result from (A) diseased conditions of the blood vessels supplying the labyrinth, or (B) disease of the eighth nerve, including its end organs in the labyrinth. From a therapeutic viewpoint cases of Ménière's disease properly belong to the general practitioner or to the neurologist.

(A) Cases of the vascular class include (1) hemorrhagic or (2) serous exudates in the labyrinth; (3) embolism of the internal auditory artery or its branches (the terminal arteries are end-arteries like those of the brain[1]) (4) embolism (5) arterio-sclerosis (responsible for sudden anemia and possibly for nerve atrophy) (6) aneurysmal pressure on the nerve (7) leukaemia (probably responsible for hemorrhagic exudates or nerve impoverishment).

(B) Cases due primarily to neuritis, include: (1) Toxic neuritis (salvarsan, alcohol, quinine, etc.) (2) infectious neuritis (syphilis, mumps, influenza, typhoid, tuberculosis, cerebro spinal meningitis, diabetes) (3) tumors of the 8th nerve itself and tumors pressing upon the 8th nerve (cerebello-pontine angle) (other nerves frequently affected at the same time) (4) meningitis with adhesions (other nerves frequently affected).

CASE REPORTS.

A Case of Ménière's Disease, Apoplectic Form, Occurring During Childbirth.—Mrs. W., age 38, referred from San Diego, on account of deafness in the right ear. The deafness was noticed after the birth of her last child, six months ago. Had never had any deafness or other ear trouble prior to that time. The labor was difficult—on coming out from the anesthetic she noticed great dizziness, nausea and vomiting. She did not attach any special significance to the symptoms; had never had similar experience in previous labors (has three healthy children). The dizziness continued two or three days, then subsided. Deafness was noticed on lying on her left ear. My examination showed complete nerve deafness. Weber to the good ear; bone conduction decreased; absolute deafness to whisper, speech, C to c_4 forks and to Galton whistle.

The etiological relation to the labor, in this case, and the sudden onset, would indicate a hemorrhage or embolism of the cochlear branch of the artery. A toxic neuritis would be also a possible explanation. Lecompte[14] reports a similar case occurring in childbirth. H. Knapp[10] reports a similar case after miscarriage.

A Case of Meniere's Disease, Apoplectic Form, Atrophy of the Cochlear Nerve; No Permanent Injury to the Vestibular Nerve.—Miss S., age 27, referred October 29, 1912, on account of deafness in right ear. Two months ago, while making a purchase in a drug store, suddenly noticed a queer buzzing in the ear and sudden dizziness; had to "grab the counter to keep from falling;" did not lose consciousness; had to lie down; a doctor was called, said she had a "slight stroke." She was able to walk with help to a taxicab and went home; vomited in an hour and off and on all day. After a day or two these symptoms passed off, but noticed she was deaf. She did not have any headaches or fever; the attack was not at the time of her menstrual flow, which had always been normal; her general health had been and is now excellent. Examination shows complete deafness in the right ear to acoumeter, speech, forks C to c_4 and to Galton; normal nystagmus reaction, caloric (hot and cold) and to turning.

I saw and re-examined this patient March 1, 1913, and found no changes from those above noted.

The suddenness of the attack; the complete deafness in the affected ear, without change in the vestibular reaction, and the absence of other signs or symptoms would indicate a hemorrhagic or serous exudate in the cochlea, resulting in complete atrophy of the organ of corti; or blocking of the cochlear branch of the artery by an embolus.

A Case of Ménière's Disease, Apoplectic Form; Partial Deafness; No Vestibular Changes.—C. E. S., age 36, referred October 20, 1909, by Dr. Bryant, Glendale, on account of repeated attacks of dizziness and noises in the ear. His trouble dates back one year; began while walking on the street; suddenly fell backward and to the right; did not lose consciousness; was dizzy and nauseated for only a few minutes. He had a similar attack nine months ago and another attack last night. Each attack is sudden, unheralded by any symptoms and not accompanied by loss of consciousness. He always falls to the right. His family physician could find no diseased condition.

He has never had syphilis; does not drink; general health is excellent.

Examination of ear, nose and throat is negative, except for bruised right auricle due to last night's fall. The hearing in the left ear is slightly impaired; watch 1 inch, ordinary conversation 8 feet, bone conduction reduced 20 seconds (c 128 d. v.). Air conduction c to c_4 reduced as follows: C —40 sec., c_1 —30 sec., c_2 —20 sec., c_3 —30 sec., c_4 —15 sec. The patient says all the tones in the left ear are sharp as compared to the right. November 3, 1909, patient returns, has had another attack, similar in every way to the others. The dizziness lasted not over a minute, "had to grab the counter in the store to keep from falling—felt as if some one had bowled me over."

April, 1913, Dr. Bryant reports that the patient is still living and in excellent health; has moved up North and has had only three attacks in the last two years. He states that the patient had a malarial history.

The cause in this case is, of course, obscure. The symptoms are suggestive of nerve irritation, from pressure periodically applied. The fact that the patient always fell to the right (the side of normal hearing), is contrary to my own experience in these cases. They have almost always fallen or had a tendency to fall to the diseased side.

A Case of Mild Form of Ménière's Disease, Probably Tobacco Neuritis.—Mr. W. F. S., age 48, referred by Dr. Ross Reed, Pasadena, July 3, 1912, on account of sudden deafness and fullness in right ear and dizziness. Trouble dates back one month; thought it was probably due to sudden blast from an automobile horn; has never had previous ear trouble; has not had a cold in the head; no catarrhal symptoms. General health good; denies syphilis; is married, has several children; does not drink, but has always smoked excessively, cigars and pipe; stopped smoking ten days ago.

The dizziness comes on at times; the spells are not severe enough to fall, but make him stagger; thinks the dizziness only comes when he moves his head; "the room seems to turn around."

Examination of the ear showed no middle-ear signs. Hearing in right ear considerably reduced: acoumeter, 10 inches; whisper ("four" and "six"), 6 inches and 18 inches respectively; conversation, 12 inches (dim); bone conduction reduced 15 seconds; Gelle positive; forks C to c_1 greatly reduced; c_2 and c_3 barely heard at all; c_4 poor; Galton whistle questionable (hears with left ear); vestibular reaction to cold water and to turning is normal both sides. Examination of the eyes (Dr. L. W. Mansur) was negative. After five months' treatment this patient improved somewhat. His last record (December 27, 1912), shows marked improvement in the hearing for forks and moderate improvement to conversation—whisper 6 feet; conversation 7 feet; forks c, poor (barely heard); C —25 sec.; c_2 —20 sec.; c_3 normal; c_4 normal. He had stopped smoking and had lived an easy life. He took about 4 ounces of potassium iodid, in five-grain doses, three times a day. I never could see the slightest improvement after catheterization of the tubes. in fact, inflation seemed to make him temporarily more deaf.

A Case of Nerve Deafness (Both Ears). Following an Attack of "Grippe"; Dizziness and Vomiting.—Mrs. W., age 81 years, referred October 23, 1912, on account of deafness. Two years ago patient had a severe attack of "grippe"—confined to her bed for five months; no meningeal symptoms; towards the end of the illness had severe vomiting spells with dizziness, attributed to the stomach; remembers that there were some noises in the ear; did not have earache nor ear discharge; became profoundly deaf. When she was able to get out of bed, noticed she could not walk in a straight line. Examination showed both drum membranes normal. Hearing to acoumeter, whisper and speech is gone; bone conduction (c 128 d. v.) reduced; forks C to c_4, negative in the right ear; in the left ear could hear c_3 fork alone (30 seconds); Galton not heard in either ear; vestibular reaction not tested.

J. M. Downey[17] reports a case of labyrinthine deafness, due to "grippe," in which in addition to the cochlear nerve atrophy, there was loss of vestibular reaction.

Apoplectic Form of Ménière's Disease; Complete Deafness.—Mrs. A. S., age 33, referred April 21, 1910, by Dr. Pallette. Deafness in right ear dates back 15 years. There was no earache and no discharge; remembers considerable dizziness and noises in the ear and that the hearing was suddenly lost and has never changed. For about 10 years has had attacks of dizziness, nausea and vomiting, coming on suddenly, so severe has fallen several times; last attack one and one-half years ago. The attack would not last long and there was never any unconsciousness; attributed to the stomach.

Examination: Middle-ears normal. Left, hearing normal; absolute deafness in the right ear to speech and all forks (C to c_4); Galton questionable. (Hears with good ear.)

In this case the persistence of the attacks of dizziness, severe and sudden, over such a long period of time, is noteworthy.

A Case of Sudden Deafness, Dizziness and Vomiting.—C. F., age 62, referred by Dr. Bancroft, on account of deafness (left ear) of four days' duration. The deafness came on suddenly and without apparent cause. Noticed a "feeling of fullness in the ear and got very dizzy, had to lie down, did not fall, was nauseated and vomited." Did not have a cold; was not sick. Deafness in the right ear for years.

Examination: Left ear, drum membrane thin, translucent, good mobility; no signs of middle-ear inflammation. Hearing, acoumeter 1 inch; whisper, 12 inches; speech, 2 feet; Rinne, positive; bone conduction reduced 25 seconds (C 128 fork), c reduced 15 seconds; c_1 fair; c_2 fair; c_3 fair; c_4 almost normal; Galton heard up to 25; vestibular reaction normal in both ears.

The age in this case would indicate a vascular change in the labyrinth, due likely to arterio-sclerosis, and producing sudden anemia.

Sudden and Complete Nerve Deafness; Partial Restoration: Anemia (?)—Mr. H. S., age 57, referred April 30, 1910, from San Diego, by Dr. Fry. Complaint: Buzzing in both ears and deafness. Onset, four days ago, attributed to exposure to strong east wind and to removal of a heavy beard; thinks he caught cold, but has no signs of a recent cold in the nose and no middle-ear signs. Has always had good hearing in the right ear, but some deafness in the left ear for years. His hearing tests show complete absence of hearing in right ear to acoumeter, speech, and to forks C to c_4, and to Galton. In the left ear hearing greatly reduced: acoumeter one-half inch, whisper 5 inches, speech 3 feet; forks, C —20 seconds; c_1 good; c_2 good; c_3 good; **c_4 not heard; Galton not heard;** vestibular reaction, through turning, equal on each side, 20 seconds duration.

May the 4th (four days after my first examination), I was surprised to find that there was a return of hearing in the right ear, acoumeter, negative; speech, 6 inches; C fork heard well; c_1, c_2 and c_3 fairly well heard, reduced about 20 seconds; c_4 not heard at all. The patient left for England. I referred him to an otologist in London. I never heard from this case. The complete deafness, sudden onset, and partial restoration of hearing, together with the age of the patient and hard radial arteries, indicated vascular disturbances in the labyrinthine vessels, possibly local anemia of the cochlea.

Richard Lake[15] reports several interesting cases of vertigo and deafness due to arterio-sclerosis.

A Case of Nerve Deafness; Apoplectic Form of Ménière's Disease; Ocular Paralysis.—E. P. M., age 55, a clinic patient, came to me first in November, 1904, right ear deafness noticed three years before, came on suddenly, ear felt stuffed up with hissing noise in ear; no pain; no discharge; was working at his trade (blacksmith), but deafness was not apparently caused by any sudden noise or blow on the ear, no headaches; has been completely deaf in right ear since. Dizziness began six months ago, off and on, mild at first, but soon, after one day, fell down unconscious for a few seconds; got up and was ashamed for fear of being thought to be drunk (patient never drinks, not a glass of beer in two months on an average). In a week or two had another attack preceded by a trembling; since then has had three or four attacks, but never quite lost consciousness. Last attack yesterday, preceded by increase in dizziness, but no other prodromic symptoms. Double vision; first noticed blurring and over-lapping of images about 17 years ago, gradually got worse and for past five years has been severe, has to use a ground glass on left eye to enable to walk (consulted Dr. Pardee, San Francisco, who told him the nerve in the left eye was affected).

Previous history: No illness since childhood; denies syphilis; general health is good; is married, has seven children.

Examination: Middle-ear condition is practically normal both sides. Hearing, complete deafness in right ear for all sounds. In this case we have a record of ocular paralysis of 17 years' duration, while the 8th nerve became affected only three years ago.

It has been my privilege recently to see at autopsy a brain from a case of this kind. The patient, a woman, age 50, had suffered for years with disturbances of the 3rd, 5th and 6th nerves. The vessels at the base of the brain showed multiple aneurysmal dilatations, and marked atheromatous changes. Death had resulted from rupture of one of the aneurysms. The brain itself was normal. This patient had suffered from ocular paralysis for years. Diagnosis made only at autopsy.

A Case of Deafness and Dizziness, due to "Nervous Prostration," Deafness Almost Complete.—Mrs. B., age 52, came to my office October, 1912. Almost two years ago had a vomiting spell; deafness dates from that time. After this spell had regular "nervous prostration"—had been very nervous ever since—the last two months before coming to me patient had been getting better. After this spell there were many noises in the right ear—severe noises. Following this attack was sick in bed six weeks, was dizzy and had a tendency to fall to the right. Had some slight confusion in memory. Had no difficulty in swallowing.

Examination: Right ear drum dull and slightly retracted, but not sufficient to account for degree of deafness. Left ear—good glistening, large calcareous deposit below, but otherwise normal. Throat in good condition. Tube opened freely and drum membrane vibrated freely, if anything a little stiff.

It is noteworthy in these cases of unilateral nerve involvement, with vestibular irritation, that the tendency is to fall toward the affected side.

A Case of Ménière's Disease, Apoplectic Form; Cochlear Nerve Atrophy.—Mrs. H., age 50, referred March 21, 1913, by Dr. A. L. Macleish, on account of deafness, left ear. Ear trouble dates back five weeks—began with dizziness, nausea and vomiting; attributed to the stomach; was so dizzy she had to go to bed; whenever she raised up would fall forward and to the left. Dizziness and nausea lasted three days. No earache; no discharge; no fever. One year ago, after "grippe," had some stuffiness in the same ear, relieved by two or three inflations. Is positive her hearing was acute up to this sudden attack five weeks ago. Patient has been out of bed the past two weeks; is weak and uncertain in her gait, but the dizziness has gone. Examination of the eyes (by Dr. A. L. Macleish) shows glaucoma, but no ocular paralysis. Blood examination (by Dr. Walter Brem) is negative; Wassermann reaction is negative. Aural examination, left drum membrane practically normal; completely deaf to acoumeter; whisper; conversation; all forks, C to c_4, and to Galton. Caloric reaction (left) quickly developed (cold water, 66 degrees, one-half quart in left ear as against one quart in right ear); reaction nystagmus well marked, lasted thirty seconds and accompanied by considerable nausea.

It was impossible to explain the etiology in this case. Syphilis and leukemia were excluded. The patient left for her home in the East, referred to her former consultant, Dr. Charles H. Beard, of Chicago.

Spaulding[16] has recently reported a similar case from supposed labyrinthine effusion, which he considers similar to iritis serosa or episcleritis.

A Case of Nerve Deafness Associated with "Nervous Prostration"; Dizziness.—Mr. M. E. J., age 52, referred January 20, 1913, by Dr. Robert Lewis, Jr., New York. Has come to California for his health. No organic disease has been found, but has had a general nervous breakdown from long period of work as railroad man. Denies syphilis. Wassermann reaction (taken at request of Dr. Lewis), was negative. Deafness has been marked of late; rapidly grown worse in the right ear; almost complete deafness in the left ear. Has frequent dizzy spells, attributed to constipation; thinks he always tends to fall backward during the spells, "room seems to be turning around." Never any headache.

Examination: Left membrane somewhat retracted, otherwise normal; right membrane slightly retracted. Hearing (right ear), acoumeter, 1 inch; whisper, 3 feet; speech, 2 feet (dim); Rinne, positive, forks C to c_4 reduced 25 to 40 seconds; Galton heard up to 45. Hearing, left ear, absolute deafness to whisper; conversation and all forks, C to c_4, except c_3, which is faintly heard; Galton heard up to 40. Vestibular reaction is normal and equal both sides.

A Case of Atrophy of Both Cochlear Nerves; History of Hemorrhages and Dizziness.—Mrs. F. R., age 52, referred from Pomona, December 19, 1910, on account of deafness both ears. Right ear had been deaf for five years. Left ear suddenly became deaf one month ago. At present unable to hear conversation in either ear. Right side deafness began five years ago with a severe attack of dizziness and general exhaustion. Was confined to her bed for six weeks. Vomited blood and had hemorrhages from the bowels off and on for two or three months—considerable prostration. (Unable to secure any opinion as to the nature of the disease). From this attack right ear was rendered absolutely deaf, but could hear well with left ear until one month ago. Has had no earache or ear discharge and nothing to account for the sudden deafness. Dizziness during the first attack was so severe had to sit down to keep from falling.

Examination: Right drum membrane dull, slight retraction, otherwise negative. Left, the same. Hearing entirely gone in right ear, to watch, acoumeter, whisper, speech, and all forks; bone conduction (c—128) reduced to 20 seconds. Hearing left ear also entirely destroyed, except for the c—128 fork, which is heard about 20 seconds. Galton not heard in either ear. Pupils react normally to light and accommodation. No paralysis of the 4th, 5th, 6th or 7th nerve. Ears had been inflated for a month without any improvement in the hearing. Tube was open and dry and no middle-ear signs to account for the deafness. Patient was married and had several children; was not questioned as to specific history.

The peculiar attack in which there was hemorrhage from the bowels and vomiting of blood for two or three months might have a bearing on the etiology of this case. Patient was treated in an-

other part of the country. If a careful diagnosis had been made at the time of the hemorrhage the cause for the nerve atrophy might have been found.

ETIOLOGY.

As to neuritis of the auditory nerve some interesting facts are established. Neuritis probably occurs more frequently than one would think and is more easily overlooked. Wittmaack [1] states that "the cochlear branch with its associated ganglion is imbedded in an unyielding bony capsule, partly surrounded by broad lymphatic spaces"; that "the blood vessels are end arteries; that the ganglion cells are smaller than all other ganglion cells in the vertebrates; that moreover, they are bipolar and possess medullary membranes; that these anatomical relations show the elective vulnerability of the cochlear nerve."

Paul Manasse [2] in 31 cases of 8th nerve deafness found that the cochlear branch alone was affected in 24 cases. Wittmaack states, "It is not strange that a particular group of nerve fibres should be affected. This can be observed in other nerves, i. e., the recurrent laryngeal nerve, also the optic nerve—as in tobacco amblyopia; also in neuritis from lead poisoning." So with 8th nerve disease the cochlear branch alone is often affected.

Wittmaack states, "It is presumable that in the labyrinth pathological processes generally occur in the form of small morbid foci, in the form of small hemorrhages, or inflammatory exudates, or infiltrates, situated within the delicate membranous labyrinth. From many of the autopsy reports of cases diagnosed 'Ménière's' it seems to me that a serous exudate or a sudden disturbance in the lymphatic circulation may have produced the symptoms." (Case XI may be explained in this way.)

Arterio-sclerosis may produce nerve atrophy through disturbance in the nutrition of the nerve. Atrophy and neuritis cannot be differentiated clinically. One fact stands out prominently, namely, that while optic neuritis and atrophy can be diagnosed objectively, auditory neuritis and atrophy can only be diagnosed during the life of the patient by testing the cochlear vestibular nerves. That the clinical findings in such cases point to underlying conditions of grave concern to the patient, should stimulate us to examine our ear cases most carefully.

Reports in the last year or two, of neuritis, occurring in syphilitics, after salvarsan injections, show the auditory nerve affected about twice as often as the optic nerve. As to whether the syphilitic virus or the salvarsan is responsible for the neuritis cases, it is worth mentioning that Prof. Alexander in six years prior to the advent of salvarsan observed 68 cases of lues of the ear; in only 12 cases symptoms appeared in the early stage (3rd to 6th month); whereas Prof. Finger in six months had as many cases after salvarsan treatment. Alexander, therefore, concluded that there must be an etiological relation in 8th nerve neuritis to salvarsan injections.

A large number of reports are being made of neuro-recurrence after salvarsan injections. For example: Duel (Boston meeting International Otological Congress, August, 1912), stated that he had seen three cases lately of 8th nerve neuritis after salvarsan injections—all within the first two months of the specific infection—an occurrence that he had not met with in an experience of fifteen years. He mentions that Bernario collected 14,000 cases treated by salvarsan, in which 126 cases of neuro-recurrence occurred. Of the 126 cases, 51 showed 8th nerve involvement.

THE THERAPY OF MENIERE'S DISEASE.

The therapeutic measures advocated in cases of Ménière's disease have been many and of remarkable variety.

Parry [3] and [9] advocated the use of a seton placed in a fold of tissues of the neck at the base of the skull.

Blake and Putnam [5], [6] and [7], following Babinsky, used lumbar puncture with improvement in some cases. Dundas Grant [4], Bradley [11] and others following Charcot, advised use of quinine in Meniere's disease. The use of pilocarpine, potassium iodide, complete body rest, depletion by sweating, and cathartics, is rational and advised by many authorities. The use of vaccines and bacterins, as reported by one observer (Sherman [8]) seems irrational and his results not conclusive.

Where the labyrinth tests show complete nerve deafness of long duration, atrophy of the nerve has taken place, and treatment would, of course, be of no value in clearing up the condition; however, as the other cochlear nerve occasionally becomes affected it is wise to attempt to ward off trouble by using those therapeutic measures applicable to the particular case. In acute cases during the course of syphilis specific treatment is, of course, to be instituted. As to whether or not salvarsan should be used is too large a question to be discussed in this paper. It seems to me that the answer to the question largely depends upon whether the threatened damage from the specific infection is great enough to warrant running the possible risk of the toxic damage from salvarsan.

In an acute case of Ménière's disease, not specific in origin, a search should be made for the underlying cause, such as arterio-sclerosis, or endocarditis (from which a vegetation might have been broken off into the blood stream and lodged in the labyrinthine artery); or for some of the diseased blood conditions, as pernicious anemia, leukemia, etc.; or diabetes, nephritis, etc. As the treatment depends largely on treating the underlying condition, the otologist in most cases likely would best serve the patient by referring him to a good internist or neurologist, being content with pointing out the nerve change that his examination disclosed.

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MODERN THERAPY OF SYPHILIS.*

By VICTOR VECKI, M. D., San Francisco.

Physicians advanced in years, successful in their profession and having acquired the self-reliance which real or fancied experience gives, can be divided into two classes: the one composed of those who are afraid of the epithet "old fogy," and the other of those who are not.

After the first experiences with the newer additions to the diagnosis and therapy of syphilis many an older syphilologist wished he had remained an old fogy. "Our syphilitics," they reasoned, "were easy to handle, were our most grateful patients, intermittent and sufficiently prolonged treatment was invariably followed by success, the march of the disease could nearly always be predicted, accidents were seldom, catastrophes almost never happened, and where are we now? Chaos reigns."

Many a one returned to his old, trusted and easy methods, and when Corbus, at the 1912 meeting of the Section on Genito-Urinary diseases of the American Medical Association at Atlantic City, promulgated the new truth that treatment of the syphilitic should be continued vigorously during the negative phase of the Wassermann reaction if we wish for a permanent result, then not a few asked themselves: "What do we need the Wassermann at all, when we know that we must treat our patient when the reaction is positive, and now we are told we must treat him also when it is negative?"

Unfortunately things are not so simple as all this reasoning, and the Wassermann reaction has come to stay until supplanted by a better one, and though an experienced syphilologist may not need it so often as various laboratory owners think he does, he needs it very badly when he does.

While we are sure that the Wassermann reaction is something more than a symptom of syphilis, as some French authors claim, we are perfectly safe to regard it as such, and regulate our treatment accordingly, giving more energetic and longer treatment when we find the reaction positive, just as we would if skin or other symptoms were present.

One of the great merits of the Wassermann reaction is that, while formerly the opinions of various authorities in regard to the influence of alcohol upon syphilis were different, there can be no doubt now that syphilitics should abstain totally. And to think that in former times one of the most popular antiluetic remedies, Van Swieten's liquor, was given in rum and water in order to disguise its objectionable taste!

After having relied for more than four centuries upon mercury as the mainstay in the treatment of syphilis, after every single remedy boosted from time to time as a more or less innoxious substitute was found useless or at least of very limited usefulness, and just when most syphilologists began to get really acquainted with mercury and the best ways of using it, when the prejudice against mercury amongst the laymen began to disappear, the great arcanum salvarsan, the catchy 606 was heralded urbi et orbi. Like a pack of hungry wolves the syphilitics and their doctors threw themselves upon it, every one of them striving for the "sterilisatio magna." But ah! Naught seemed to be just the way it should, and all those who expected so much were woefully disappointed, and the number of tragedies enacted, disasters caused, will never be known. On the contrary, the cautious ones, those who did not expect much, were highly gratified to have obtained a new weapon against syphilis, however limited its usefulness may be. We know at present some of the shortcomings of salvarsan, some of its dangers, and time will tell what it does in the long run.

Everything seemed to be very simple and most pleasant, first salvarsan, then a Wassermann to see the result. Wassermann negative, Eureka! But unmistakable symptoms shortly after such a decisive victory were a frequent and disagreeable surprise, then the old mainstay was rigged up again, and here we have the modern therapy of syphilis; the combined treatment. We must hope that the new combination will prove as useful, if not better, than the best methods used in the pre-salvarsanian time.

Even at this time we are justified to say: "Salvarsan and its improvement neosalvarsan may not be indicated so often as their German patentees may wish and claim, but when it is indicated we must be mighty glad to have it."

When we speak of modern therapy of syphilis we must not forget the most important progress made, which consists in the almost universal adoption of the method of employing the mercury in the form of intramuscular injections. While most syphilologists were compelled to admit long ago that the best results in the treatment of syphilis were being obtained by intramuscular injections of insoluble mercurial preparations, even Fournier, the father of the intermittent and prolonged treatment of syphilis, advised so late as 1906 against the injection treatment. We were told, and students were taught, that these injections, for various reasons, are not to be employed as a routine treatment, but only when rapid action is essential, as in the more malignant forms of the disease. And again I ask: "When is, in any case of syphilis, rapid action not essential, nay, imperative? and how are we to know if, and when any case of syphilis may become malig-

* Read before the Forty-Third Annual Meeting of the State Society, Oakland, April, 1913.

nant? Finally, why should we wait until a given case of syphilis does become malignant?".

We know now that intramuscular injections of insoluble mercurial salts can be given with absolute safety, that when the proper preparation is used in the right way, the patient is never in any danger, that even calomel, the most powerful of all mercurial compounds, can be injected, the disadvantage of causing abscesses avoided and the ensuing pain reduced to a tolerable minimum.

A further great progress in the syphilis-therapy is the adoption of highly concentrated mercurial preparations for intramuscular injections, and we are now in a position to use calomel and gray oil in a 40% suspension. It is almost self understood that the preparation must be of unquestionable purity and exactness, and the technic correct into the minutest detail. A special syringe must be used for these injections, because the ordinary sized syringes would not admit the exact measurement of the quantity to inject.

Zieler's recommendation to detach the syringe from the needle not only before the injection, to see if a blood vessel is entered, but also after the injection, in order to fill the syringe with air and then to press this air through the needle in situ, is excellent. After such a procedure, the needle is freed from any rests of the medicament which may ooze out when the needle is withdrawn, thus frequently irritating the puncture-canal and causing abscess formation.

Modern syphilologists have been taught by the intricacies of the blood-tests that there can be no routine treatment for syphilis. Every single case must be studied, and the treatment modified accordingly. And for this purpose the Wassermann and Noguchi tests are of inestimable value.

We read in older text-books that the patient must be treated several months after the secondary symptoms have disappeared. Gradually this time limit was extended to 22 months, two, three, four and five years. Now we know, however, that the syphilitic, in order to be absolutely safe, must be watched, and eventually treated all his life.

The question "When shall we permanently discontinue the treatment of any luetic patient?" can be answered only one way, and that is: "When we are sure that there are no more living spirocheta anywhere in his body." Now we must wait for the man to answer our question: how can we make sure that there are no living spirochetas in any patient's body?

While we know that there can be no immovable rules in the treatment of syphilis, there are a few facts established and well worth to be emphasized and considered in every single case.

The aborting of syphilis is possible in the primary and in the early secondary stage. Excision of the primary induration or its infiltration with mercury, and the energetic use of salvarsan may succeed in obtaining that great desideratum: the freeing of the system of all spirochetae. The excision should be done more frequently, and surely not only as Marchildon recommends in cases when the Sp. pal. are shown by dark stage examination and where, however, the Wassermann reaction is negative.

We do not know how spirochetae multiply, but know to our sorrow that they do multiply. Salvarsan destroys the spirochetae, but very seldom all of them. The surviving ones seem to multiply rapidly, therefore the short duration of the sometimes surprising results obtained.

In the tertiary stage of the disease and for parasyphilitic manifestations salvarsan is almost useless. Mercury works differently and seems to impair the vitality and the reproductiveness of the spirochetae.

Mercury is still in the ring, and the more I know of salvarsan the better I like hydrargirum.

Discussion.

Dr. W. V. Brem, Los Angeles: It is a true but trite saying that any system of treatment of syphilis will finally be judged by its effect on parasyphilitic disease and metasyphilitic diseases. We know that by the use of salvarsan or mercury we can obtain positive or negative tests in the blood serum and that with either we can control the lesions, but all of us who treat syphilis—especially the neurologist—frequently see cases that have had thorough treatment with mercury in the old days and yet have developed tabes, paresis or aneurysms. Is there any way we can tell which cases will develop parasyphilitic diseases, and if there is, can we do anything to prevent these manifestations?

During the past year I have examined 61 spinal fluids from 50 patients and have given to 12 patients with positive spinal fluids 63 doses of salvarsan.

One patient about a year ago had a nervous breakdown, which was diagnosed as neurasthenia, or nervous prostration due to overwork. He traveled, seeking to restore his health, but without beneficial results. An ordinary blood examination was found to be normal. Later it was learned that he had had gonorrhea 12 years previously and had taken pills for 2½ years without being told what they were for. There had never been any lesions of syphilis, and he had no idea that he might have it. He was then sent for a Wassermann test, which was strongly positive. On account of his neurasthenic symptoms, I recommended a test of the spinal fluid, which was much more strongly positive than the test in the blood serum. The pupils reacted to light and accommodation, the patella reflexes were exaggerated, the memory and judgment good.

Another patient had syphilis 12 years ago, but recently became anxious about his condition. The Wassermann test was faintly positive. I gave him two doses of salvarsan and the Wassermann test promptly became negative. He then went for several months without treatment, at the end of which time I did a spinal puncture and the Wassermann test was strongly positive in spite of the fact that there were no signs of tabes or paresis.

From these cases and other similar ones, I have come to the belief that everyone who has had syphilis should have an examination of the cerebrospinal fluid before being discharged as possibly cured. My conclusions from those cases of syphilis in which I have examined the cerebrospinal fluid as well as the blood serum, and from the result of the treatment of the parasyphilitic patients, I should like to read:

1. As a working hypothesis we may assume that syphilitic patients with positive spinal fluid reactions have the infection localized in the central nervous system and are candidates for the late syphilitic nervous phenomena. In support of this is the recent demonstration by Noguchi that spirochaetes are present, in a considerable percentage of

paresis cases, in the brain tissue. Noguchi demonstrated them in 12 cases of general paresis out of the 70 he examined.

2. Every patient should have a spinal fluid examination before being discharged as cured, and his spinal fluid and blood should be examined at intervals for a long time afterward.

3. There is no close relation between the Wassermann test in the blood serum and in the spinal fluid. Although we have done the tests in a considerable number of secondary and tertiary cases, most of the spinal fluids have been from parasyphilitic cases. We have frequently found the blood negative and the spinal fluid positive, and at times the reverse has been true. In making the test, we titrate the strength of the reaction so that results before and during treatment can be compared. We begin wih small quantities of fluid and large quantities of complement, increasing the delicacy of the test until finally 1 cc. of fluid is used with 1 unit of complement (1 cc. of a 1-10 dilution of guinea pig serum). Nine tubes are used in each test. We demand that the test shall be negative in the most delicate tube before we think of suspending treatment.

4. With the Wassermann test positive in the spinal fluid the butyric acid test has also been positive. It may be relatively weaker or stronger, and it may be strongly positive when the Wassermann test is negative. The cell count also bears but little relation to either the Wasserman or butyric acid tests.

5. The positive Wassermann reaction in the spinal fluid is more difficult to get negative than that in the blood serum. With three intravenous injections of salvarsan together with mercury treatment, we have reduced the reaction on an average of about 50 per cent.

6. So far we have been able to reduce only one spinal fluid from a positive to a negative reaction. This was only weakly positive in the beginning, and it became negative to both the butyric acid and Wassermann tests after three intravenous injections of salvarsan. We then gave three more doses of salvarsan and mercury treatment before we felt that we might safely discontinue treatment. One intensely positive spinal fluid we reduced 80 per cent after 8 doses of salvarsan. The patient was a far advanced paretic when we began and he is now fairly normal.

7. We believe that mercury has but little effect upon tests in the spinal fluid, although we feel that it should be used vigorously. Our tendency is to shorten more and more the interval between injections of salvarsan.

In conclusion, I would say that the examination of the cerebrospinal fluid probably offers the greatest hope of determininig beforehand which patients are candidates for the parasyphilitic nervous affections, and that the proper and persistent use of salvarsan, with mercury as an adjunct, offers great hope of preventing the development of these dreaded conditions.

Dr. Kaspar Pischel, San Francisco: I think Dr. Vecki's paper is of great value for the education of our patients. The public has gathered from magazines and newspapers that the diagnosis of syphilis is very simple and the treatment still simpler. They go to a Wassermann laboratory and if the test is negative it will be very difficult for a physician to convince the patient of the contrary. The patient has probably not heard of experiences, like the one I had the other day: the blood was taken from a patient by two first-class men at the same moment for the Wasserman test. The one reported negative and the other positive.

The treatment they think is simpler still. One injection of salvarsan and the patient expects a cure to be accomplished.

As soon as Dr. Vecki's paper is printed, I will give it to every syphilitic patient of mine to read and think over.

Dr. Vecki, closing discussion: When I spoke about the Wassermann, I included the examination of the spinal fluid as well as of the blood.

LUETIN AS AN AID IN THE DIAGNOSIS OF SYPHILIS.*

E. S. LOIZEAUX, M. D., Sacramento.

Correct diagnosis in medicine increases in importance with the rapid additions to our knowledge of the definite causes of disease and eradication by specific treatment. Uncertain and ambiguous terms in the signing of death certificates are rejected by statisticians, and if the matter of a correct diagnosis is important after the patient is dead, how much more important must it be while he is still living and capable of being restored to health. Each addition, then, to correct diagnosis should be welcomed and studied for its appropriate use. In diseases with protean manifestations, and long chronic course, with practically no self-limitation, all possible diagnostic aids are of distinct value. This is especially true in syphilis and the object of this paper is to take up the most recent practical aid in the diagnosis of this disease.

First: It will probably be of interest to review a little of the history of syphilis, in regard to its diagnosis.

Early medical authorities made some distinction between the three venereal diseases: chancroids, gonorrhea and syphilis; but with the advent of the virulent epidemic in Europe at the end of the 15th century the differential diagnosis of the three diseases became hopelessly mixed and remained so through many years of heated controversy and hard study.

The discovery of a "living contagium" in syphilis began as early as 1658 and discovery of a new cause came more frequently each year, until in 1905 it was stated that in the previous twenty-five years 125 causes of syphilis had been announced as discovered.

On the 17th of May, 1905, Schaudinn and Hoffman read a convincing paper before the Berlin Medical Society giving conclusive proof that a fine, delicately staining, spiral organism, was the cause of syphilis. This organism, they named Spirocheta pallida. Corroboratory reports of similar findings came in so fast from all over the world that by December of the same year the scientific world accepted this organism as the exciting factor of syphilis. Succeeding years have further confirmed this and the once mysterious cause of syphilis is now cultivated in artificial media and successful animal inoculations made (a).

This organism has led to the positive diagnosis of syphilis by finding it in the primary lesion, the secondary lesions, and in the case of the syphilitic fetus in large numbers in the liver and distributed throughout other tissues of the body (b).

Very recently, Noguchi has announced the finding of characteristic staining spirochetes in the cortex of the brain in paretics, and in the spinal

* Read before the Northern District Medical Society at Woodland, Cal., June 18, 1913.

cord in cases of tabes. Only a certain percentage of cases showed the positive findings (c).

The difficulty of demonstrating this organism, however, and the confusion with similar organisms (d), has prevented this method of diagnosis from becoming more widely used. It is particularly applicable in diagnosing the primary lesion.

The next practical addition in the diagnosis of syphilis is known as the complement fixation or deviation test, and was brought out by Wassermann, Neisser and Bruck in 1908. Briefly, this is a chemical reaction between three chemico-biological reagents, viz: Antigen (extract of fetal syphilitic liver; or lipoidal substances); syphilitic serum, and complement (a body present in greater amount in guinea-pig serum). Two other chemico-biological reagents act as indicators for the reaction between the other three: washed blood corpuscles, and sensitized serum for the particular class of corpuscles used.

This reaction has opened a new field of investigation in regard to the study of syphilitic serums and a vast amount of work has been done on them. Noguchi in studying the reaction simplified the technic, very considerably, and by changing the corpuscles used, from sheep to human, obtained a superior degree of constancy in the reaction (e). It has also been demonstrated that extracts other than syphilitic fetal liver extracts would act as very efficient antigen. Among other reactions made on syphilitic serums are:

The butyric acid reaction—Noguchi.

A long list of complement fixation tests with various antigens,

The cobra venom hemolysin test (f) and;

Very recently, a proposed control for the Wassermann reaction by the measurement of the amino-nitrogen of the blood serum (g).

The study of the whole Wassermann reaction and its modifications and side reactions tends to show the following:

1. That the Wassermann reaction and modifications are not absolutely specific for syphilis (h).

2. That the complement fixation reaction in syphilitic serums is not due to syphilitic antibodies in the blood, but upon admission to the blood of abnormal substance from the pathologically changed tissues (i).

We now come to a consideration of a more specific reaction of simple application. This is offered in Noguchi's "luetin." He defines this as follows:

"I have proposed the name Luetin for an emulsion or extract of pure cultures of Treponema pallidum, which is designed to be employed for obtaining, in suitable cases, a specific cutaneous reaction that may become a valuable diagnostic sign in certain stages or forms of syphilitic infection" (j).

The reaction with Luetin is dependent upon the state of allergia. This state is a specific syptomatic response on the part of the infected and sensitized organism to the parenteral reintroduction of the corresponding antigen (k).

In syphilis this response is, unfortunately for early diagnostic purposes, seldom obtained in the primary and secondary stages unless the patient has already been treated with the mercurial or arsenical preparations. The main response is obtained in the treated and late cases in which there are no symp-

Case No. 46. Sixth day.
Few hours after rupture of pustule.

Case No. 24. Fourth day.
Pustular type.

toms or in which symptoms have recurred after a course of treatment. Late untreated cases also give the reaction (1).

This paper is to present a series of 52 cases injected with this preparation, most of the cases being controlled with the Wassermann reaction, Noguchi modification.

The luetin was obtained direct from Noguchi and contained six strains of Spir. pallida, which had been grown on artificial media in pure culture, then ground; sterilized with heat; and preserved with .5% tricresol. Equal parts of luetin and physiological salt solution were mixed just before use and one minim injected into the skin with a fine hypodermic needle. The skin was properly sterilized and dried before injection.

The successful injections raise a marked flat white papule at the site of the needle point. This pale swelling subsides in the course of twenty minutes. No control injections were used as Noguchi states that he has decided to omit them, because his experience has shown them to be superfluous.

The reaction is determined as follows:

The negative reactions.

A. Complete absorption and no erythema at the site of injection.

B. A very small erythematous area at and around the point of injection but no induration. This disappears in four or five days. A slight yellowish pigmentation may remain for a short time.

The positive reactions.

A. The papular form; this is a marked red papule with a zone of redness about it which makes its appearance in about twenty-four hours, slowly increasing for four or five days, then receding.

B. The pustular form; this resembles the papular, excepting that it progresses to pustular formation and subsides more slowly.

C. The torpid or retarded form; this reaction begins as a papule then subsides before the usual papular reaction. At the end of ten days or two weeks the injection site lights up and progresses to pustular formation of mild type.

In the cases reported in this series, no constitutional effects were observed, but close observations were not made on temperatures. Temperatures, diarrhea and symptom aggravations have been noted in other series.

Case No. 32. Sixth day.
Papular type.

Case No. 44. Seventh Day.
Pustule intact.

A study of the tabulated cases tends to show the following:

1. That the reaction is of distinct value in the diagnosis of latent and treated syphilis.

2. That in some cases it is more sensitive than the serum reaction.

3. That it does not react in negative syphilitic infections.

4. That it is particularly useful in determining cures in conjunction with the serum reaction, with which it may be used as a control.

Case No.	Time Infected.	Treatment.	Present Symptoms.	Serum React.	Luetin.
1.	11 years	3 years	None	Negative	Negative.
2.	6 years (a)	13 months	None	Negative	Negative.
3.	29 years (b)	None	Tabes	Negative	Negative.
4.	5 years (c)	Heavily 2 years	Crack corner mouth	Negative	Negative.
5.	Denied	None	Ulcer of tongue	Negative (d)	Negative.
6.	4 years	3 years	Iritis (e)	Negative	Negative.
7.	Congen.	Irregular 22 years	Cerebral endart	Negative (f)	Papular.
8.	No history	None	None	Negative	Negative.
9.	Denied	None	Spastic paralysis	Negative	Negative.
10.	17 years	Irregular	Leucoplakia	Postive	No report.
11.	15 years (g)	6 months	Tabes	Negative	Negative.
12.	Chancroids	Local	Orchitis (h)	Negative	Negative.
13.	Questioned	None	Gonorrhoea	Negative	Negative.
14.	Questioned	None	None	Negative	Negative.
15.	16 mos. chrancroid	Local	Measles	Negative	Negative.
16.	Questioned	None	None	Negative	Negative.
17.	Uncertain	2 years	Eruption on nose	Negative (i)	Negative.
18.	Denied	None	Tabetic symptoms	Negative (j)	Negative.
19.	Questioned	None	Facial neuralgia	Negative	Negative.
20.	5 years	Heavily	None	Negative	Negative.
21.	6 years	1½ years	Tabetic symptoms	Faint positive	Papular.
22.	Not determined	Well treated	Tert. leg ulcer	Positive	Papular.
23.	Not determined	Being treated	Tert. lesion	Positive before	Papular.
24.	36 years	Moderate	Tabes	Weak positive (k)	Pustular.
25.	Congen.	Being treated	Teeth and eye	Weak positive	Papular.
26.	Not determined	Not determined	Not determined	Postive	Papular.
27.	Questioned	None	None	Negative	Negative.
28.	Few weeks	Being treated	Secondaries	Positive	Pustular.
29.	No history	None	Adenitis	Negative	Negative.
30.	20 years	"Cured"	Ununited fracture	Postive	Pustular.
31.	18 years	Early heavy	None	Negative	Negative.
32.	20 years	Being treated	Tert. leg ulcer	Positive before	Papular.
33.	9 years	Irregular	Tert. nose lesion	Not taken (l)	Torpid form.
34.	20 years	2 years	Tabes	Not taken	Papular.
35.	Denied	Not obtained	Tert. nose lesion	Not taken	Papular.
36.	Not determined	Being treated	Tert. lesions	Not taken	Pustular.
37.	5 years	Active and 606	None	Not taken	Papular.
38.	No history	None	Endometritis	Negative	Negative.
39.	No history	None	Neurasthenic	Negative	Negative.
40.	13 years	Irregular	Tert. leg lesions	Not taken	Papular (m)
41.	No history	None	None	Not taken	Negative.
42.	Not obtained	Not obtained	Scars and tert. ulcer	Not taken	Papular.
43.	4 months	Early, very active	None	Negative	Negative.
44.	20 years	Irregular	Gastric crises	Not taken	Pustular.
45.	34 years	Short time	Tabes	Not taken	Pustular.
46.	11 years	Hot Springs and Hg	Ulcerative rhinitis	Not taken	Pustular.
47.	No history	None	None	Not taken	Negative.
48.	No history	None	None	Not taken	Negative.
49.	No history	None	None	Not taken	Negative.
50.	20 years	3 years	Headache	Negative	Negative (n)
51.	No history	None	None	Not taken	Negative.
52.	Questioned	None	Vertigo	Negative	Negative.

5. That it may be successfully applied while the patient is under treatment.

6. That the failures in para-syphilitic cases suggest that there may be some other cause than syphilis for tabes and general paresis.

In this regard I would like to quote Robertson in the Lancet, 1912, who claims that syphilis is merely a predisposing cause for the para-syphilitic, central nervous diseases, because he has isolated a bacillus of the diphtheroid group; bacillus paralyticans from the GU tract and nasal mucosa of these cases. Cultures can also be obtained from the spinal fluid in some of the cases. Typical ataxia and paresis has been developed by him, with this organism, in a considerable number of rabbits. Early tabes has been improved by him with a vaccine treatment, and striking results claimed by the intraspinal injection of an antiserum produced in sheep.

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(b) Diagnosis and Treatment of Syphilis, Browing-McKenzie, 1912.

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(d) Experimental Research in Syphilis, Noguchi, 1912.

(e) Serum Diagnosis of Syphilis, 3rd Ed., Noguchi.

(f) The Cobra Venom Haemolysin Test. Stone & Schottaedt. Arch. of Int. Medicine, 1912, x 8.

(g) A Quantitative Chemical Reaction for the Control of Positive Wassermann Results, D. M. Kaplan. N. Y. Med. Jour., June 7, 1913.

(h) The Interpretation of the Results of the Wassermann Test, C. F. Craig. Jour. A. M. A., Feb. 22, 1913.

(i) Producing Complement Binding Reactions by the Addition of Chemical Substance to Normal Serum, E. Rominger. Munch. Med. Woch., Apr. 22, 1913.

(j) A Cutaneous Reaction in Syphilis, Noguchi. Jour. Exp. Med., Vol. XV.

(k) Infection and Immunity, Simon, 1912.

(l) Serum Diagnosis of Syphilis, Noguchi. 3rd Ed.

a. Infection very questionable.

b. Diagnosed as chancroids and only treated locally, no symptoms ever noted until onset of tabes.

c. Married 18 months before and has healthy infant 6 months old.

d. Report from Lane Hospital, S. F.

e. Had attacks of same type of iritis before syphilitic infection, two negative serum reactions one year apart, iritis responded to anti-rheumatic treatment.

f. Three negative serum reactions. KI being administered at the time.

g. Questionable syphilitic infection.

h. Gave positive skin reaction to tuberculin. (Von Pirquet.)

i. Two negative serum reactions. Very questionable infection.

j. Complement fixation negative on both serum and spinal fluid Moderate positive Butyric Acid reaction on spinal fluid.

k. Reaction done with spinal fluid.

l. 606 given intravenously, 6 months before.

m. Sick with typhoid fever at the time of the reaction.

n. History of sore not suggestive of chancre. Headaches not characteristic and not affected by energetic anti-syphilitic treatment.

Reagents used for the complement fixation test as follows (serum reaction):

Human blood corpuscles.

Fresh guinea-pig complement.

Normal liver lipoids (insoluble acetone fraction).

Anti-human rabbit amboceptor (paper strips).

Suspect serum.

CHRONIC INTESTINAL AMEBIASIS, WITHOUT DYSENTERY.*

REPORT OF TWO CASES.

By R. S. CUMMINGS, M. D., Los Angeles.

My excuses for reporting the following cases are, 1st, the scarcity of literature concerning amebic infections without dysentery, and 2nd, to add my testimony to the efficacy of ipecac to rid the colon of amebas.

A short resumé of the history of the ameba might be appropriate. Lambe in 1859 was the first to observe an ameboid body in the discharges of a case of dysentery, Loesch of St. Petersburg in 1875 was probably the first to identify a true ameba in the stools of a dysentery patient. Koch in 1883 demonstrated the ameba in the sections of an ulcerated bowel, thus showing the relation between the parasite and the intestinal lesion. In 1886 Kartulius reported 150 cases from Egypt in which he found amebas. Osler in 1890 reported the first amebas found in this country, a little later Stengel and Musser reported several cases, as well as Dock at Galveston.

The earlier students recognized but one type of ameba termed ameba coli. Councilman and Lafleur suggested the term of *ameba dysenteriae.* In 1903, however, Schaudin classified amebas into *entameba histolitica,* pathogenic for man and cats, and *entameba coli* which is non-pathogenic. Viereck described another pathogenic form which he termed *entameba tetragena* because of four neuclei in the cysts. Recently, however, Darling seems to have proved that *entameba tetragena* are merely encysting forms of *entameba histolitica.*

While much has been written regarding amebic dysentery, little has been said concerning the infection without dysentery or with alternate constipation and diarrhea. Osler in his practice dismisses it with a paragraph. Brem and Zeiler give the best definite report of cases treated, seven in all, two of whom had no diarrhea. Simon mentions the constipation with occasional exacerbations of diarrhea in his series of cases. Tuttle in 1904 reports four cases having a colitis, malaise and asthenia, yet having no diarrhea. Anders and Rodman called attention to patients having the alternate constipation and diarrhea due to amebic infection.

In the treatment of amebic infections, many things have been used, the most common of which are rest and a nourishing diet, upon which Musgrave lays especial stress; colonic irrigations of quinine, thymol, silver nitrate, and ipecac solutions; irrigations of ice water as recommended by Tuttle, and injections of pure coal oil by which means Haines reports cures. Musgrave reports twelve patients free from amebas 20-90 days following the use of protoiodide of mercury. Deeks and Shaw recommend large doses of bismuth with which they claim good results. Thornburgh thinks the cases treated with ipecac relapse and cites eighteen cases cured with argyrol given as an enema in one to ten per cent. solutions. Appendicostomy in chronic infections is recommended especially by Anders and Rodman, Holt, Tuttle and Gant. Tuttle recommends formalin irrigations through the appendix.

While ipecac has been used for many years in small doses, it is only during the last few years that it has been systematically used in large doses (60-80 gr. per day), as recommended by Manson. The majority who have used ipecac thoroughly and systematically in large doses, as Simon, Dock, Brem and Zeiler, Freund, and others, report very favorable results, and are enthusiastic regarding it. Allan has recently apparently cured two patients by the hypodermic use of emetin hydrochloride.

The following are the records of the two patients who came under my observation:

On Sept. 23rd, 1911, Mrs. M., an American housewife, aged 40, was referred to me by Dr. Simpson of Long Beach. The complaint was weakness, nervousness, and constipation, with an occasional looseness of the bowels lasting for a day or two.

Both family and personal histories were unimportant.

Her trouble began 15 years ago, after moving from Louisiana to Texas. She had a prolonged attack of dysentery which was checked in a few months with difficulty, since which time she has never been real well. Seven years ago patient began to be badly constipated and one year later had a return of the dysentery for a short period. Three years ago she had another attack which was very severe and was difficult to check. Since has been very badly constipated, having to resort to laxatives most of the time. About once a month, however, the bowels would be very loose for a day, moving two or three times. For the past few years the patient has been very despondent, having endeavored to commit suicide at one time.

The examination was practically negative except that the abdomen showed slight tenderness upon deep pressure over McBurney's point. The blood showed the hemaglobin to be 90% (Talquist), reds 4,500,000, whites 8,000, and a normal differential count. In the stool were found many large quite motile amebas, each containing numerous large vacuoles. Flagellated monads were very numerous.

Treatment was begun on October 19th by administering twenty 3 gr. salol coated ipecac pills, following a fast of 12 hours. These were vomited up in one and a half hours with coating dissolved. The next day the same number were repeated with a half grain of morphine followed in one-half hour by one-quarter grain more. These were all vomited in two hours. Then salol coated capsules were tried but these were vomited seven hours later after the coating of some had been dissolved. The patient was nauseated for 48 hours following this.

After a few days' rest, following a cleansing enema, a starch enema was given containing 50 grains of ipecac. In two hours the patient began to vomit. This continued for two or three days accompanied with loose bowels. This was followed by an enema containing 90 grs. of ipecac. After two hours this was expelled followed by about 12 hours of vomiting. Two more enemas of 50 grs. each were given, both being followed by vomiting lasting from 12 to 36 hours. The patient became so weak that it was deemed best to stop treatment. On Nov. 30 no amebas were found, but on Dec. 4 there were very many present after a dose of magnesium sulphate. The patient, however, was feeling much better, having a fine appetite and had ceased to be so melancholy.

Believing that the patient was unable to withstand the absorption of but very small amounts

* Read before the Los Angeles County Medical Association on April 3, 1913.

of ipecac, we planned to inject a solution into the cecum, leaving it a certain length of time and then wash it out through the rectum by a normal salt solution. On Dec. 10th cecostomy was done by Dr. J. E. Colloran and a catheter inserted. The appendix, the lumen of which was obliterated at the base, was removed.

On the 23rd, three gallons normal salt were passed through the colon coming out a tube placed into the rectum.

On the 24th one gallon normal salt was passed through, followed by one pint starch solution in which four drachms of ipecac was suspended. This was immediately washed out by normal salt. The following day this was repeated, the ipecac solution remaining five minutes. The next day the same procedure was repeated, the ipecac remaining ten minutes. The following day, the 27th, this was repeated, the ipecac remaining fifteen minutes. One hour later nausea began. The bowels moved the following evening, but no amebas were seen. On the 28th the ipecac remained twenty minutes and the nausea was much worse with some vomiting. Dec. 29th no treatment was given, but nausea and some diarrhea continued. Dec. 30 four drachms of ipecac in starch was given, remaining for twenty-five minutes in the colon and then washed out. Nausea continued. Dec. 31st the same treatment was repeated, the nausea and some vomiting continuing for thirtv-six hours, when it began to subside. Jan. 10th, 1912, patient began to feel fine. Dr. Walter V. Brem examined stool, finding flagelated monads but no amebas.

Jan. 13th stool again examined with same results. Jan. 20th, twenty days after last injection and twenty-four days after disappearance of amebas, Dr. Brem again examined the stool and no amebas were found. The following day Dr. Colloran closed the wound and beside a good deal of nausea the patient made an uneventful recovery, returning to her home in Texas on Feb. 8th. Since this time several communications have been received, the last one in Dec., 1912, one year after treatment, at which time the patient said she felt perfectly well, was working hard and was not at all nervous or weak. The bowels were quite regular and no periods of diarrhea had occurred.

My second case, Mr. R. C. P., came to me on Nov. 11, 1911, age 31, male, single, farmer. His complaint was weakness and indigestion. His family history was negative, also his personal history. He had lived in Idaho all his life except for a few weeks spent in Elgin, Oregon, one year previously.

His present trouble began two years previously when he had a severe cold and a diarrhea of two weeks' duration. Since has been growing a little weaker, and gradually losing in weight. Has been suffering with sour stomach, constipation with an occasional looseness of the bowels lasting for one or two days, loss of appetite and a great deal of gas on both stomach and bowels.

The physical examination revealed a patient very poorly nourished, rather pale, muddy sclerae, pale conjunctivae and an apparently normal thyroid; lungs showed a healed tuberculous lesion at both apices. The heart was normal and abdominal examination negative. The reflexes were normal, the urine examination was normal and the blood examination showed a condition of secondary anemia only. An examination of the stool revealed large very motile amebas containing numerous large vacuoles, and was full of flagelated monads.

On Nov. 25th, after fasting 12 hours, 20 three grains calol coated pills were given. In two to three hours the patient vomited several times, throwing up possibly one-half of the ipecac. The following day 18 pills were given, followed by about the same amount of vomiting as the previous day. Sixteen three grain tablets were given the next day and 14 the following with about the same amount of vomiting.

The following day, Nov. 29th, three grain tablets were given, two-thirds of which were vomited up. The patient had become so weak and the stomach so irritable, no more medicine was given for two days, when following a cleansing enema, an enema containing 60 grains of ipecac suspended in eight ounces of starch solution was given. This was followed by much tenesmus and diarrhea. Two days later, Dec. 2nd, another enema of 60 grains was given, followed by very little distress. Dec. 5th 20 three grain tablets were again given as patient felt much better and about a third of the ipecac was vomited. This was repeated the following day and again repeated the next day, when vomiting became severe again.

The stool was examined on Dec. 1st, six days after beginning treatment, and no amebas were found; again on Dec. 21st, two weeks after close of treatment, the examination showed no amebas but flagellated monads were present.

The patient was not seen again until March 2nd, when the stool after taking salts, showed no amebas or flagellated monads. At this time the symptoms had all disappeared and a gain of 24 pounds in weight had taken place.

From observing these two patients, my attention was called to the fact that in all cases of constipation in which there was a history of dysentery or diarrhea lasting several days at any period in their history to suspect amebic infection.

Also that probably some of the patients previously diagnosed as neurasthenics had a chronic amebic infection of the large intestine. These two patients had been so diagnosed before coming to me.

That when the colon is thoroughly irrigated with an ipecac solution, the amebas are destroyed. Whether this is due to direct contact of the ipecac with the amebas or is due to the absorption of emetin into the blood or both, has not been as yet definitely proven.

THE CUTANEOUS REACTION OF SYPHILIS —(LUETIN REACTION).*

(Third Communication.)

By JULIAN MAST WOLFSOHN, M. S., M. D., San Francisco, Assistant in Neurology, Stanford University Medical Department.

Syphilis, because of its polymorphous lesions, is one of the most difficult of diseases to accurately diagnose. In its latter stages it not only simulates other diseases, but in certain cases, no demonstrable lesions or physical signs can be found to aid us in making a diagnosis. In primary and secondary syphilis the treponema pallida can in most cases be demonstrated microscopically, so that our chief interest in this paper centers itself about the later stages of the disease where laboratory methods must needs be often employed to ascertain the presence or absence of syphilis.

Since the advent of the Wassermann reaction, a great many cases of syphilis have been correctly diagnosed which otherwise would have been relegated to the collection of medical enigmas. How many cases of gummata of the brain or meninges have been saved from needless operation by this laboratory reaction!

* Read before the San Francisco County Medical Society, April 8, 1913.

Even before the Wassermann reaction was discovered, scientists such as Neisser, Bruck, Wolff-Eisner, Tedrechi, Nobl, Cuiffo, Gauthier, Bertin and many others have tried to produce a cutaneous reaction for syphilis similar to the tuberculin skin reaction, by applying various extracts of syphilitic tissues to the skin of patients suspected of syphilis. But results from this procedure have been varied and unreliable, probably due to the contamination with secondary organisms and with tissue extracts which both dilute and render the syphilitic extract innocuous.

So soon as the treponema pallidum was discovered as the specific cause of syphilis, hope for a substance similar to tuberculin was renewed, and to this end many investigators bent every energy toward growing this organism. In 1911, Noguchi achieved this end. Not long after this he prepared an emulsion—which he named luetin, consisting of the pure cultures of several different strains of dead spirocheta pallida in the media on which they grow anaerobically, viz: ascitic fluid agar. (For details of the method of preparation of the luetin, the reader is referred to Noguchi's original article in the *Jour. Exp. Med.*, 1911, XIV, 99, or to my previous report in the *Johns Hopkins Hospital Bulletin*, August, 1912.)

The luetin when applied intradermically in certain syphilitics, produced a definite local reaction which was absent in cases which were non-syphilitic.

A control emulsion, which consists of the luetin minus the spirocheta is used as a check on the luetin injection, and is introduced in the same manner and at the same time as the luetin in another part of the body.

The full technic and method of administration of this test has been discussed in detail in a previous communication. Briefly stated, equal parts of the luetin and sterile normal salt solution are mixed and, in adults, 0.07 c.c. (.05 c.c. for children) of this mixture are injected intradermically with a very fine hypodermic needle into the left arm preferably over the biceps. Similarly, the control emulsion is prepared and injected into the right arm. Readings are made, when practical, every two or three days for four to five weeks when the reaction is negative. A positive reaction can be diagnosed at the end of 48-72 hours. It was found that marked local reactions occurred almost constantly when the luetin was injected subcutaneously so that now no readings are made in any case where the injection has been made too deep or where blood oozes from the injection site.

The normal or negative reaction: In a large number of diseases other than syphilis, there appeared shortly after the injection a slight erythematous area which, in some cases, soon disappeared, but, in others, increased in intensity so that by the second day there was a rather marked erythema, but never was any induration noted. This erythema began to recede in twenty-four hours, and by the third to fourth day nothing remained but a slight pigmentation.

The positive reaction can be divided into the papular, vesicular, pustular, torpid and hemorrhagic forms.

The papular form consists of a definite indurated nodule with a more or less definite area of erythema surrounding it. This appears within twelve to twenty-four hours and usually increases in size and hardness until the third to fourth day and then regresses.

In many cases a few vesicles may be seen surmounting the papule. These finally coalesce and either disappear or progress into the pustular form. This variety is especially seen in the cases which present violent or extremely rapid reactions. It is also seen in this type over the site of injection of the control emulsion. The pustules usually burst, discharge their contents and then dry.

The torpid variety sometimes occurs in cases having had intensive anti-syphilitic treatment, and is especially seen in the cardiovascular complications of syphilis. Here the reaction is never very marked and usually appears at any time from the end of the first to the fifth week. In a few of these cases a large hemorrhagic pustule appeared two to three months after injection; discharged and then healed, leaving nothing but a pigmented area. Scar formation was never seen in any case tested.

Occasionally there is a constitutional reaction consisting of malaise, fever to 102°, nausea, diarrhea and tender axillary glands. These disappear within twenty-four hours as a rule and have never given rise to any alarm on the part of the patient or doctor.

The cause of the luetin reaction: The luetin reaction may be said to be due to a hypersensitiveness of the tissues of the patient to the proteids of the spirocheta pallida—a condition called allergy—plus a susceptibility of the skin of syphilitics late in the disease to trauma—called umstimmung. In the majority of cases allergy is no doubt the prime factor in the causation of the reaction, but "umstimmung" is also to be reckoned with because of the many positive reactions over the control site of injection where no spirocheta are present. In view of this explanation one would not expect to find a positive reaction in primary or early untreated secondary syphilis.

Summary of the Syphilitics Tested.

Of eight cases of congenital syphilis, in which the Wassermann reaction was present in 100%, the luetin was present in but 75%. Antisyphilitic treatment had been instituted in these cases.

Primary Syphilis: The Wassermann and luetin tests were negative in one case of chancre of four days' standing (spirochetae pallida expressed from the lesion in this case).

Three of five cases of secondary syphilis gave positive luetin reactions, while the Wassermann reaction was positive in all five. The cases giving the positive luetin tests were all being treated with intensive antiluetic medication.

In tertiary syphilis where the patients have usually been, or are being treated, the Wassermann reaction is not so reliable as in the earlier stages. In twenty-six of these cases the Wassermann reaction was positive in but 80%, while the luetin reaction was positive in 96%. Two of these cases

who had had energetic treatment showed positive reactions on the 10-12th day.

In latent syphilis because, clinically, data is lacking to make a positive diagnosis, and because the history of syphilis is usually lacking, we have to rely chiefly on the Wassermann reaction or upon the fact that if the patient is a woman, her children might show some taint of inherited syphilis. It is in this type of case that the luetin reaction is of extreme value—the luetin reaction was present in 100% of these cases—the Wassermann in but 64%. That is, the luetin reaction is not only positive in those cases of latent syphilis giving positive Wassermann reactions, but also in approximately 100% of the other cases of latent syphilis which were not brought to light by the Wassermann test.

By para-syphilis one means either the later syphilitic central nervous system affections, or the cardio-vascular complications of syphilis. Here, too, does the luetin reaction come to our aid. Twenty-two luetin and but sixteen Wassermann reactions were positive in twenty-five patients with cardio-vascular syphilis, and of fourteen tabetics 57% gave positive Wassermann and 92% gave positive luetin reactions.

100% of both the Wassermann and luetin reactions were positive in each of two cases of optic atrophy and tabo-paresis.

A cursory analysis of the above cases shows that the luetin reaction is constantly present in treated congenital and secondary syphilis and in the later stages of this disease. The Wassermann reaction in these cases is less constantly present. In untreated congenital and secondary syphilis the opposite condition holds true, i. e., the Wassermann reaction is positive oftener than the luetin. In other words, the luetin reaction may be said to be supplementary to the Wassermann test in these types of syphilis, and it is in this that the luetin will make a valuable addition to our laboratory diagnostic aids.

The results from over 900 tests made upon the syphilitic and the non-syphilitic patient seem to justify the conclusions that

(1) The luetin reaction is specific for syphilis;

(2) The luetin reaction is especially valuable in the later stages of syphilis;

(3) Treated secondary and congenital syphilis is apt to show positive luetin reactions;

(4) In any case of suspected syphilis, whether previously treated or not, a negative luetin reaction must be observed for at least four to five weeks so as not to overlook a delayed reaction.

TABLE I.

Stage of Syphilis.	No. of cases.	Wassermann. +	Wassermann. −	Wassermann. %	Luetin. +	Luetin. −	Luetin. %	Control. +	Control. −	Delayed.
Congenital	8	8	0	100	6	2	75	0	8	2-12th day
Primary	1	0	1	0	0	1	0	0	0	
Secondary	5	5	0	100	3	2	60	1	4	
Tertiary	26	21	5	80	25	1	96	17	9	
Latent	17	11	6	64+	17	0	100	12	5	
Parasyphilis	43	16	9	64	22	3	88	14	9	2-20th day
Cardiovascular	25									
Central nervous System	18	8	6	57	13	1	92	9	5	1-6th day
Tabes Dorsalis.	14	2	0	100	2	0	100	2	0	
Tabo paresis	2	2	0	100	2	0	100	2	0	
Optic Atrophy	2									

Discussion.

Dr. R. L. Wilbur: I have watched a number of these tests and have taken a good deal of interest in this work; my conclusions are similar to those of Dr. Wolfsohn. For a time, until I realized the possible effect on the skin, "umstimmung," I was disturbed by the reaction of the controls, but one is soon able to make the necessary distinctions. I also agree with Dr. Wolfsohn that we have a very valuable aid in the luetin test, but it should not take the place of the Wassermann test. The two should be used side by side. In routine work it would be a mistake to depend only on the luetin test.

Major Roger Brooke: I have had a limited experience in the use of luetin, but have found it quite satisfactory in those cases associated with a negative Wassermann. Since then I have used it in tertiary, latent and parasyphilitic cases. In this type of case I have found this reaction not only interesting but have gotten in many cases positive reactions when all other aids had been negative. I think that it should be used as a supplementary measure, but certainly in primary and parasyphilitic cases, particularly in those cases associated with a negative history, it is of great value.

Dr. H. C. Moffitt: Dr. Wolfsohn kindly asked me to discuss his demonstration to-night, but I told him that I preferred to wait. It is exceedingly important to have one's own clinical material before passing judgment on such questions.

As we use these convenient tests, we are, of course, liable to run away from the pure clinical examination, and trust a little too much to them to make the diagnosis for us. Although realizing how valuable these tests are, I would emphasize looking at a patient carefully clinically before they are made. We should not forget, in the positiveness we have in the tests, the value of the small stigmata we find in patients at the bedside. I have in mind particularly the examination of th pupils and eye grounds and the cardiovascular signs. It is true that we have been helped tremendously in the interpretation of those signs by the reactions, but I feel that we can make a clinical diagnosis of syphilis in many more cases if we make our thorough physical examination.

I am now seeing a number of cases that have a diagnosis of syphilis made through the Wassermann, and perfectly justifiably, but these cases are not suffering from their syphilis now, and too much importance is being given the Wassermann reaction in that respect. For instance, patients may have active tuberculosis or spinal tumors in the presence of a Wassermann reaction. Dr. Sherman will remember one of these cases, on which he operated, which had a Wassermann reaction but who, we felt from clinical examination, had a spinal tumor. Simply because a patient shows a positive Wassermann or luetin reaction does not necessarily mean that the disease we see in that patient is syphilitic.

Dr. H. B. A. Kugeler: There is one point in connection with the Wassermann and luetin reactions that attention should be called to. My attention was called to it by Dr. Jones of the State Journal; I do not think he has pointedly called attention to it, but indirectly he has warned us of the dangers that will result from the Wassermann reaction. In a case in Los Angeles a man made a diagnosis of incipient tuberculosis; the patient was examined by someone else and was told that he had no tuberculosis and never had had it. The first physician was sued, and it cost the State Society a great deal of money for his defense. If a patient has a positive reaction from the Wassermann test, we are inclined to tell him that he has syphilis. The next man that takes his blood may not find it. It is a very dangerous thing to tell a patient that because of a positive Wassermann he has syphilis. I am just telling you this as a warning of the liability of suits that are going to happen to some of us if we are not more specific in our statements.

Dr. Harry E. Alderson: I would like to say that I have seen many of these reactions at the Stanford University clinics. Some of the cases observed by Dr. Wolfsohn came from the skin clinic, as he has stated. I have never seen a definite luetin reaction appear in a patient definitely known to be non-syphilitic. This corresponds with the experience of those who have worked with Noguchi since the beginning. The test is certainly of some value, especially in latent and in tertiary cases. I have in mind the case of a man who had syphilis, had been given thorough treatment by Professor Fordyce of New York, and was considered well. He reported to me occasionally for observation. I tried the luetin test and was surprised to obtain a positive reaction. Then I had his blood examined and the serologist reported a triple x Wassermann. This experience is met with occasionally. We get a positive luetin reaction where we do not expect it, and that leads us to look a little further for more evidence of lues, and sometimes we find that our search has been warranted. As for the reaction itself, the luetin lesion is something more than a papule—it is a definite nodule. There is definite induration extending under what you see on the surface, and there are all degrees of this induration. There is no difficulty in distinguishing the control from the luetin after observing the two for several days. In the majority of cases the control subsides in a short time; while the luetin reaction persists for a much longer period.

ENTERO-CLYSIS IN THE TREATMENT OF WEAK HEARTS.*

By DR. WM. WATT KERR, San Francisco.

Allow me to preface the following remarks by the statement that I am not going to suggest the use of colon lavage in all cases of weak heart action, but only in those instances where there is good reason to believe that the feebleness of the myocardium may be induced or increased by absorption of toxins from the alimentary canal, and even then the treatment is not capable of universal application.

Entero-clysis or colon lavage is an instance of a therapeutic method that has been productive of much evil, and even death, because it has been recommended indiscriminately by thoughtless physicians, or laymen, who are incapable of selecting suitable cases or recognizing favorable from unfavorable conditions for its administration, who at the best have a very hazy idea of the benefits and are absolutely ignorant of the dangers attendant upon such a treatment. The following description was given to me by a patient as a fair sample of a morning conversation that might be heard between the inmates of one or other of the various sanatoria where the lavage treatment is practised as a matter of daily routine:

"Good morning, Mrs. Jones. How much did you hold this morning?" "Oh, just a quart!" "Really! I took nearly three quarts, and Mrs. Smith can now hold a gallon; but I expect to do as well as she does before I leave for home."

And so the story goes, day in and day out, occasionally punctuated by some weak-hearted unfortunate having a suden copious evacuation of an overdistended bowel, followed by a syncope that brings him to a full stop. Nearly every one is more or less familiar with such incidents which deservedly warrant censure of the negligence and ignorance exhibited, but they should not bring the therapeutic method into disrepute.

Entero-clysis is practised in a great variety of diseases, but, so far as I am aware, little has been said or written about its use in relieving the distressing symptoms of patients suffering from cardiac weakness that is caused or aggravated by intestinal intoxication, either because the relation between the two conditions is occasionally overlooked, or the use of internal intestinal disinfectants, such as urotropin, salol and guaiacol is relied upon to check the process. All of those, however, are extremely uncertain in their action in the large bowel and, however useful they may be as adjuvants to the treatment, cannot be compared in efficacy to the immediate removal of the putrescent material.

In November, 1905, I visited Mrs. R., age 65, who complained that she could not lie upon her left side, and that she was awakened nearly every night by one or more attacks of palpitation. There was a sensation of weight in the epigastrium and a constant desire to inspire deeply. The pulse rate was 140, the cardiac apex was in the sixth space four and one-quarter inches to the left of the sternum, and on auscultation a blowing mitral systolic murmur was easily heard. The area of hepatic dullness was increased.

Every other night, for three doses, she was given two pills containing blue mass and compound rhubarb pill, and four times daily she received ten minims of the tincture of digitalis. At the end of forty-eight hours the pulse rate had dropped to 120 and the patient felt very much better, but after this the case dragged and for several days there was little or no improvement. One morning the nurse mentioned that, notwithstanding frequent and successful use of laxatives, the stool for the first time contained some dry scybalous pieces; consequently instructions were given to wash out the bowel with a warm saline solution every alternate morning, and upon the night preceding the lavage to introduce into the colon, through the long tube, about six ounces of sweet oil and to advise the patient to retain it all night if possible. After the third oil injection a very large quantity of dry fecal matter came away, and then each lavage showed less and less until at the end of about two weeks

* Read before the California Academy of Medicine, Novemuber 25, 1912.

the returning stream appeared to be normal. From this time on the oil was discontinued, but the saline lavage was used every fourth day for two weeks, after which time it was abandoned, and the patient was advised to take petroleum emulsion three times daily after food as well as the following capsule every night in the hope of preventing the feces from becoming dry and of increasing the intestinal tone:

℞

Ext. Physostigmat. grs. ii
Ext. Nucis Vom. grs. vi
Ext. Cascar Sagrad grs. xxx. Mix

Ft. mass et divide in capsules xii.

From the day that lavage was commenced the patient began to respond to treatment and improve. She remained perfectly free from cardiac discomfort until the beginning of this year when she had an attack of influenza, and this was followed by cardiac depression and intestinal atony that after a time yielded to a similar line of treatment, so that at the present time she is in perfectly good health for a lady of her age.

It is not necessary to mention other instances as this sufficiently illustrates the topic offered for discussion, but it may be of interest to recall some of the *data* upon which the treatment is based, as well as to refer to the type of cases that are most liable to be benefited by it.

The alkalinity of the colon makes it particularly well adapted to the growth and activity of the bacteria producing putrefaction in the proteids that have escaped digestion and absorption in the small intestine, and which in the process of putrefactive fermentation yield not only peptones and proteoses but also numerous terminal products such as indol, skatol, phenol and the animal alkaloids generally known as ptomaines, some of which are excreted in the feces while others are absorbed and, after undergoing farther change, are eliminated in the urine and bile.

Not infrequently we meet with acute symptoms due to the action of these toxins, but that possibly happens only when putrescent food containing such substances already formed in considerable quantities has been ingested; on the other hand the mental and physical lassitude, the occasional attacks of slow or intermittent pulse, palpitation and cold extremities, that are so frequently associated with intestinal indigestion, constipation or inactivity of the liver, all indicate that defective elimination or excessive formation can result in a slow chronic form of auto-intoxication.

The heart cases in whom I have seen the most marked benefit follow colon lavage are patients from sixty years of age and upwards where senile myocardial changes are beginning to make themselves felt, and where the growing inability or disinclination to exercise induces a loss of tone in the intestine so that, although actual constipation may not exist, the bowels never are thoroughly evacuated, and consequently a very favorable condition for putrefaction of the colon contents and auto-intoxication results. When a patient suffers from chronic constipation he is aware of his condition, and by the use of laxatives insures a daily clearance and thus may obviate the consequences of fecal retention. But there may be another reason which explains why those cardiac symptoms are more readily produced in people who have acquired a tendency to irregularity or imperfect evacuation of the bowels during the latter years of life than in those who have been constipated almost from childhood, and that is the well-known fact that a tolerance against the toxins of putrefaction appears to be established not only in individuals but in races. Thus it is notorious that the natives of Siam, as well as the Eskimo and other races, prefer to eat their fish and meat in a state of mal-odorous putrefaction, and some of the Chinese tribes regard rotten eggs as a delicacy, while the Zulu rises to the epicurean climax when he talks of heaven as "Ubomi," which being interpreted means "maggoty meat"; evidently he likes things very high. It is therefore evident that a tolerance of the common toxins of putrefaction is developed, and it is quite possible that this takes place slowly in those who have suffered from constipation from early life. Furthermore, if the liver becomes passively congested as a result of weak circulation, or if the hepatic cells are injured or exhausted by the specific character or excessive amount of the toxin absorbed into the portal circulation, then the liver will no longer be an effectual barrier against the introduction of toxins into the general circulation and constitutional symptoms may result.

As an illustration of the influence of intestinal toxins on the heart one cannot help thinking of the relations between the proteid alkaloid choline and the vegetable alkaloid muscarine.

The substance lecithin, which is present in varying quantities in many foods, and in large quantities in yolk of egg and brain tissue, is split up by the pancreatic juice into glycerin, phosphoric acid, fatty acid, and choline, which latter is highly toxic but is usually, as a result of bacterial action, eliminated as carbonic acid, menthane and ammonia. Choline resembles muscarine in its toxic effects and has been transformed into muscarine synthetically by a process of oxidation. Again, muscarine has been obtained from decomposed beef, so that the question naturally arises: Since choline is normally found in the intestine and can be transformed into muscarine, and since muscarine has been found in decaying beef, is it possible that under certain abnormal conditions, such as excessive formation or defective elimination of the former, or some perversion of metabolism, the transformation may take place within the human body? If such be the case then we can understand the symptoms in many chronic cases of auto-intoxication, because it is well known that muscarine depresses the motor power of the heart, causes slowing and finally cessation of the beat by stimulating the vagus, arrest finally taking place while the heart is in diastole.

In considering the advantages of colon lavage, the great absorptive power of the colon for water must be taken into account apart from the mere cleansing effect of the entering and returning streams, and since this is not associated with a corresponding watery secretion as is the case with the small in-

testine, the water that is retained in the colon, which is always considerable, is absorbed, flushes the tissues and circulation of many toxins that have been absorbed, and eliminates them by diuresis. This answers the criticism occasionally made that entero-clysis only cleanses the colon while it has no influence upon toxic conditions due to disturbance in the small intestine; moreover, it should be remembered that there are two reasons why lavage of the small intestine is not so imperatively demanded. First: While water is absorbed to a considerable extent from the small intestine there is a compensatory secretion of fluids into the bowel so that the contents remain equally liquid all the way from the pylorus to the ileo-cecal valve, and consequently there is not the same opportunity for stagnation as to the large bowel when absorption of liquid is so far in excess of secretion that the feces become dry and formed; indeed Noel Paton (Human Physiology 352) estimates that in the entero-hemal circulation of fluids about 3000 c.cm. of secretions, about half the volume of the blood, are poured into the intestine every day and almost entirely reabsorbed. Second: In the small intestine normally only those bacteria causing carbohydrate fermentation are particularly active, while in the large bowel protein putrefaction is a constant and normal occurrence. Lastly it may be asked: Since bacterial fermentation takes place normally in both large and small bowel, may we not by this process of lavage interfere with a physiological process to such an extent as to seriously interfere with nutrition? First it should be clearly understood that entero-clysis is not advised for healthy persons nor for every form of sickness, but only in those cases where there is distinct evidence of pathological processes resulting from intestinal putrefaction; and even then it is not to be used continuously but to be gradually discontinued as the special symptoms abate. I mention this because there are laymen, unfortunately countenanced by members of the medical profession, who find in colon lavage a panacea for all existing bodily ailments and a prophylactic against all imminent diseases, who consequently advocate its use in sick and well alike with as little compunction as they would order a foot-bath. Second: Physiological research has shown that "while the presence of the bacteria confers no positive benefit, the organism has adapted itself under usual conditions to neutralize their injurious action. According to Metchnikoff, on the other hand, the constant production and absorption of bacterial toxins from the intestine is one of the important causes of a loss of resistance on the part of the body to the changes which bring on senescence and death." (Howell's Physiology, 796.)

The amount of fluid used in an injection should never exceed one quart of warm salt solution at a temperature of 100° to 103° F., indeed smaller quantities are to be preferred because they do not distend the bowel, and their expulsion is not so liable to be followed by the faintness or syncope which occasionally ensues if the patient with a weak heart be allowed to suddenly expel a large quantity of liquid from the bowel, especially if he be the subject of aortic regurgitation. The weaker the heart the more urgent the necessity for limiting the amount of water to one pint, and for cautioning the patient to allow the return stream to escape intermittently instead of in a gush. The pressure should not be more than an elevation of six or nine inches above the patient's buttocks when he is lying on his right side with the knees drawn up; and if this invariably produces pain from spasm of the bowels or induces perspiration and faintness, then the treatment should be abandoned.

If the retention of much hard fecal matter be suspected, then the injections of oil alternating with water may be used as in the case reported.

It not infrequently happens that the injection does not return, and the nurse, after waiting for a short time, repeats the process with an equal or even larger volume of water in the belief that by distending the colon to a greater extent there will be a corresponding recoil and the bowel contents expelled. This should not be permitted as the retention indicates atony of the bowel and distention will simply increase this condition; it is very much better to wait for several hours, or until the next day, at least until the water has been absorbed and voided through the kidneys. At the same time if the patient be given a course of strychnine or nux vomica the tone of the bowel will in many instances be restored.

I feel that it is somewhat presumptuous on my part to mention such details in regard to the technic of colon lavage, but I do so to emphasize the fact that the attending physician not infrequently fails to give detailed instructions to the nurse who is carrying out the treatment, and unpleasant incidents result.

Discussion.

Dr. George Ebright: Even in the presence of good health it has long been recognized that overloading combined with sluggishness of action of the large bowel is a sufficient cause for disturbance in other parts of the body. If this is true in well people, it is natural that those who are suffering from some illness would be that much the more affected. The initial dose of calomel in acute illnesses bespeaks the recognition of this opinion. Where the illness is of a chronic nature it stands to reason that intestinal stasis must have its ill effect. The importance of this is, in chronic heart conditions, too much neglected. For a number of years I have found benefit follow the administration of teaspoonful doses of castor oil for five or six consecutive nights in chronic heart trouble associated with flatulence.

Dr. J. B. Frankenheimer: I would like to mention a certain instrument of torture that some people use. It is a rubber bag like a hot water bag, with a nozzle in the center on which the patient sits and regulates the pressure of the fluid which is forced into the rectum. The apparatus is advertised by a New York firm, and has a capacity of about 3 quarts. It is obvious that this is anything but an ideal method of taking an enema. I have had at least one case in which distension of the descending colon has occurred. Of course, this is not pertinent to the paper, but I would like to call the attention of the physicians present to this method so that precautions should be taken to describe to the patient the proper way of flushing the colon.

Dr. Kerr, closing discussion: I happen to have one or two patients who have adopted the use of the particular bag to which Dr. Frankenheimer referred. I have never seen the bag, have only

heard it described. My patients used it because there was no one to assist them in passing the large tube and in preparing the ordinary colon injection; but they seemed to get along pretty well and have even injected intermittently. One gentleman when in the country had to come down to this kind of thing or go without. He told me that if he used this form of injection rapidly it gave him pain, but by injecting a little, then turning the stop cock shutting it off, then injecting a little again, there was no pain. He never filled the bag more than quarter full and consequently suffered no inconvenience.

ORTHOPEDIC TREATMENT OF SPINAL POLIOMYELITIS.

By JAMES T. WATKINS, M. D., San Francisco.

The present paper was delivered in abstract before the California State Medical Society at Del Monte in April, 1912. The time limit set made it necessary to confine its scope to a consideration only of the principles governing the operative side of treatment. Here in the full text other, and if anything more important features of treatment are also given consideration. Occasional repetitions appear in the text where facts were deemed sufficiently important to warrant reiteration.

It may be accepted as finally determined that in spinal poliomyelitis we have to do with an infection which particularly attacks the nervous tissues. The characteristic lesion is a collar-like round cell infiltration of the adventitia of the blood vessels of these structures. The tendency of this round cell infiltration is to cause a diminution of the lumina of the affected vessels. In some instances they are obliterated. The degree and distribution of this vascular occlusion determines whether or not paralysis will supervene and, when paralysis does occur, whether it will be temporary or permanent.

We recognize an acute stage, or stage of invasion, a stage of recovery, and the final or end stage—that stage beyond which there will be no further improvement.

The opinion seems to prevail now that of those stricken with the disease from 20% to 25% either recover without paralysis or, after being paralyzed, recover from it. From a sixth to a third of the patients in different epidemics die during the acute stage of the disease of respiratory paralysis. The remaining victims are permanently crippled to varying degrees.

The medical treatment of spinal poliomyelitis remains at this writing unsatisfactory. Once the disease has progressed far enough to be recognizable, there is thus far no known remedy which will check an attack nor limit its distribution. It is, however, within the bounds of probability that eventually an efficient vaccine against the attacks of poliomyelitis may be evolved.

In the meantime orthopedic surgery holds out hopes of benefiting the patient in each of the three stages.

It is susceptible of demonstration that during the stage of invasion orthopedic surgery can, by immobilizing the spine, cause an amelioration of the sensory symptoms; and, reasoning by analogy from what we know of the influence of immobilization upon other spinal inflammations, it is probable that this procedure may also limit the spread of the disease. It is further susceptible of demonstration that during the second stage, that of recovery, orthopedic surgery may advantageously be employed to conserve and to develop to the utmost all of whatever muscle substance may have been spared by the ravages of the disease.

Again, in all three stages orthopedic surgery is invoked to prevent deformity, or, if deformity be present, to correct it. Finally in the third and last stage, orthopedic surgeons aim by a judicious redistribution of whatever muscular power may be left to re-establish the muscular balance about a joint and to reconstitute the function of the limb.

The Stage of Invasion.

A distressing feature of the later epidemics of spinal poliomyelitis has been the very severe pain which obtained throughout the stage of invasion. This signified that we had no longer to deal with an *anterior* poliomyelitis only, but that the sensory tracts had also been invaded.

For some time it has been recognized that acute inflammations of joints are best treated by immobilization. It remained for the neurologist Oppenheim, however, to suggest that this principle of treatment might advantageously be applied to cases of poliomyelitis. Acting upon this suggestion, Lange of Munich, in 1909, demonstrated that "children ill with poliomyelitis and suffering severe pain in the spinal column, became free from pain on the application of a plaster of paris jacket which embraced the entire trunk." And, as was noted above, it seemed to him indeed probable that this immobilization hindered the spread of the inflammatory process throughout the cord.

The most efficient fixation apparatus, and one, too, which would maintain the feet in the proper relation to the legs, was the plaster of Paris bed which the writer saw employed at the Instituto Rizzoli in Bologna. This was constructed by placing the patient with the body in slight hyperextension while the arms and thighs were maintained slightly abducted, the forearms and legs slightly flexed, and the feet at right angles to the legs and a little inverted. In this position, after being generously padded, they were individually encircled with plaster of paris bandages to a uniform thickness of one-quarter inch. The occiput was also included. When it had set this plaster of paris mold was cut through all around in a frontal plane. In this way a bed with an anterior and posterior valve was devised. Each valve was subsequently reinforced with more plaster and spanners of light wood. The plaster was cut away under the buttocks sufficiently to make room for the action of the emunctaries.

To perform the toilet of the back the accurately fitting anterior valve could be applied and then the entire appliance with the child in place, turned over upon its face. The patient would lie quietly then in the anterior valve while the posterior valve was removed to facilitate the cleansing and powdering of the skin.

For practitioners not sufficiently expert in the use of plaster of paris to construct this bivalve plaster-bed, the use of the long plain plaster of paris jacket is to be recommended. The gas-pipe and canvas frame bent backward and made more efficient by sand bags about the patient also offers a vast improvement over the ordinary bed and pillows.

THE SECOND STAGE OR STAGE OF RECOVERY.

It is of the very greatest importance, especially where the disease has attacked the upper extremities, that efforts be made to constantly maintain the paralyzed limbs in postures in which the ligamentous structures of their joints will not be subjected to strains. Each limb should in a sense be supported by itself and not permitted to drag on nor to dangle from the trunk. At the same time the postures of selection should be those the maintenance of which would oppose all tendencies to the development of contractures.

Muscular regeneration may continue for a year (Lange), eighteen months (Ridlon), or even two years (Jones) after the occurrence of the paralysis. Therefore it behooves us, during this period, to do all in our power to conserve and develop the remnant of muscular power left. The agents we may employ to this end are the various electric light, hot air, and water baths, electrical currents, massage, and above all, the exercise treatment. All authorities are agreed, however, that for three to eight weeks after the invasion no treatment at all should be given, and that for the following two to three months it should be given sparingly and gently.

The theory and practice of balneotherapy is elaborated much more fully in works devoted to that subject than it would be possible to discuss it here. It is worthy of record that because of the buoyancy of the body in water, voluntary movements can often be performed while in the bath tub much earlier than they can when out of it. For that reason it will nearly always be found of value to begin developmental exercises while in the tub for the daily bath.

There is a diversity of opinion among the men best fitted to express one as to the therapeutic value in poliomyelitis of the electrical currents. While he was an assistant in Hoffas' clinic at Würzberg the writer was taught to believe in the value of electricity. To-day he is inclining more and more to the opinion that electrical currents play a very small part in the therapeutics of spinal poliomyelitis. This much may be said of them, however, and especially of the slowly interrupted galvanic current: they are of value in so far as they tend to maintain the tone of temporarily paralyzed muscles by causing them to contract—that is, by exercising them. In this respect they may be said to hasten recovery. But that the use of electric currents will bring about recovery in a muscle which could not otherwise have been saved, remains to be proved. On the other hand, where they cause pain and frighten little children, their use is to be condemned. These views are diametrically opposed to those in vogue at Würzburg ten years ago.

Massage skilfully conducted is a valuable agent in augmenting nutrition. Unwisely performed, it may be capable of doing serious mischief. In this relation, Lange says: "I should like to warn you against a rough, hard massage, and above all, against a deep, firm, stroking massage. When you reflect how soft and tender the muscle paralyzed by poliomyelitis is, you will acknowledge that we must be very careful in handling such a delicate structure; just as it is possible by a powerful massage to remove fat on an undesirable part of the body, so we can, I am convinced, weaken and injure a paralyzed muscle by a rough massage instead of strengthening it, as is our object and intention."

Authorities are unanimously of the opinion that appropriate exercise is of greater value than all other factors in conserving and re-developing muscle force. As Lovett puts it: "Muscle training is coming to occupy the prominent place in our therapeutics that it deserves and is superior to either of the two measures" (electricity and massage) "mentioned. As a therapeutic measure it has the advantage of directness in being exactly what the muscle has got to do in restoring or improving function."

Clinical observations justify a minuter study of the processes by which the exercise treatment is believed to work for the betterment of these cases.

Before entering upon a discussion of the theory and practice of the exercise treatment it may be appropriate to pause long enough to consider what should be the proper attitude for the physician to maintain toward his patient and toward the patient's family, a factor of no small importance in determining the final outcome of the case. Once it is manifest that the patient is not going to die of a respiratory paralysis, it is the writer's conviction that the attitude to be maintained by the physician toward the outcome of the disease should be one of *cheerful optimism.* We have no assurance that recovery will not be complete, and further we do know that in a large proportion of the cases only one or two groups of muscles will be permanently incapacitated. On the other hand, we must recognize that the patient and his family are entering upon a course of treatment which, if the most is to be made of it, will certainly occupy months and may occupy years. At the outset they are crushed under the weight of the calamity. If they are to find the courage to undertake and to carry on throughout its weary length that treatment which will make for the best results, we have to be ready at all times to offer a ready sympathetic and optimistic shoulder for them to lean upon when momentarily spent with the fight. This I regard as a most solemn duty.

Success in the exercise treatment depends in large measure upon the co-operation of the child. The younger the child the more difficult will it be to obtain and maintain this co-operation. The almost infinite variety of exercises to be performed in the course of a long treatment have each of them to be repeated hundreds of times. Therefore the person, usually the mother, upon whom this work will in most instances devolve, must become the playmate and the physician or gymnast directing the work, not only be the mentor, but also the comrade of the little child. Certain facts must constantly be kept before the attendants and parents. One of these is that deformities are not necessarily the consequence of disuse, but that they are the gradually acquired results of improper function. Also that unless anticipated, improper function is sure to result when certain muscle groups

reacquire their activities sooner than do their antagonists; and in other instances that it is caused by distortions produced in the member by the pull of gravity. Consequently, distortion is to be guarded against before and during the period of repair by means of massage, of special exercises, of careful balancing and of braces.

Another matter to be emphasized is the importance of permitting, encouraging and even *requiring* the child to overcome without assistance the disabilities visited upon it by its paralysis. Our most difficult task will be impressing this fact sufficiently upon the mother. It will be asking her to act against every instinct of her nature. But if she does not learn and practice it, she will materially hinder the recovery of her child.

The child should be led to put forth every possible effort in moving the legs and feet along some simple selected lines. But the moment it complains of being tired, exercises should cease. As a layman, Prof. Barnes, says: "There can be no doubt that if exercise is too long neglected, memories of movements formerly used will tend to fade out of the mind and a habit of helplessness will be formed. There can also be no doubt that effort energizes nerve centers and prepares them for greater efforts. And if properly handled, the drills and exercises will react on mind, disposition and will so as to greatly develop and strengthen them in turn." In young children especially the exercises should take the form of a series of plays. In a little boy under my care the right leg is Jack and the left leg Jill, and there is a constant rivalry between them to see which can do the most "stunts"—stunts of which the little boy is an almost breathless spectator.

In play with normal children, much benefit may follow efforts at imitating them.

Without stopping to discuss them separately, it may be well to enumerate the following factors which have proved of value: Exercise in the bath, gradually diminishing the amount of water as the limb gained in strength, a baby walker so constructed that the feet could just touch the floor, a tricycle with the patient's feet strapped to the pedals, riding horseback or rather pony back, swimming, innumerable games similar to those just enunciated, massage and appropriate braces.

I turn now to what I may call the theory and practice of the exercise treatment.

The most comprehensive discussion of the theory and practice of exercise therapeutics, as it applies to the treatment of spinal poliomyelitis, is that given by Bucholtz. He in turn accepts and quotes the views of Leyden, of Goldscheider, of Jakob and of Lazarus. These views of an enormously important and, in this region, almost wholly unconsidered subject, the writer has attempted to epitomize in the following pages. Occasionally he has been impelled to quote Bucholtz' words. Repeatedly he has appropriated his ideas or those of his teachers.

To obtain a proper conception of the manner in which the exercise treatment works in infantile paralysis we have to consider its effect—

1. Upon the primarily affected neurons; and
2. Upon those neurons which are (a) in functional association with the primarily affected neurons, and (b) its effect upon neurons which might possibly be substituted for neurons which had been destroyed.
3. Its effect upon the musculature.
4. Its effect upon (a) the joints, (b) the bones.
5. Its effect upon (a) the internal organs, (b) the general health.
6. Its effect upon the patient's mind.

As has previously been said, it is practically impossible in poliomyelitis to anticipate which neurons will remain paralyzed. Regeneration has been known to occur a year or eighteen months after the paralysis. Again, when a neuron, or group of neurons, ceases working, all the neurons which are in functional association with it suffer from disuse. These are the associative neurons which connect the various cerebral centers, and the sensory neurons which, passing centripetally from the bones and joints, make it possible for the brain to control the correct performance of a motion.

The term "Stimulus threshold" about to be used signifies the point or height to which a stimulus must attain either in amount or in intensity in order to overcome the inertia of a given neuron. Or to say the same thing another way, whenever a stimulus acquires an amount or intensity sufficient to overcome the inertia of a given neuron, the point so attained is termed the "stimulus threshold" for that neuron. Naturally this is not a constant quantity nor state of being. Outside agencies may act to raise or to lower the stimulus threshold of a neuron.

The stimulus employed must be above the "stimulus threshold" of a given neuron before the latter can be said to be "in a stimulated condition." A stimulated condition of the primary will act as a stimulus to the associated neuron if the stimulus be above the stimulus threshold of the latter. Again, though a stimulus may itself be below the stimulus threshold of a given neuron, it can none the less prepare the way for a subsequent stimulus, thereby enabling the latter to overcome the inertia of the primarily affected neuron and possibly to be continued over into the contact neuron.

Mention should be made regarding the effect of the exercise treatment upon neurons which may possibly be substituted for neurons which have been destroyed. Observations by both German and French writers have seemed to show that when the pyramidal tracts on one side were destroyed the subcortical centers and the associative neurons of the same hemisphere, as well as parts of the other hemisphere, may to some extent take their places. In order to take advantage of these adjunct nervous tracts, they have to be educated and their neuron thresholds lowered through judiciously chosen and sufficiently protracted courses of exercise.

Orthopedic surgeons will recognize in the action of these alternate nervous tracts the probable explanation of some hitherto inexplicable phenomena which have appeared late in the course of the after-treatment of conditions following spinal poliomyelitis.

The influence of exercise upon muscles is to increase the power and endurance of a muscle and

then actually to increase its amount. This improvement must necessarily be associated with a favorable influence upon the nervous apparatus.

"In most parts of the body the muscles are arranged in such a way that if one muscle be paralyzed another may take its function to some extent, and this substitution is at times surprisingly good." Where we have to deal with partial paralysis following spinal poliomyelitis, our aim should be to determine which muscles can best be substituted for the paralyzed ones and, in so far as is possible, to strengthen such a substitute. We will consider this matter again in discussing the principles which underlie the operative treatment of spinal poliomyelitis.

The prevention of contractures and of stiffening may be the principal result of exercise treatment as applied to joints. The writer has repeatedly seen milder degrees of contracture disappear under passive manipulation. Severer cases may call for the employment of mechanical appliances with or without surgical intervention.

It is practically always noticeable that the bones of a limb affected by poliomyelitis are smaller than those of its fellow. This may be due in part to destruction of the centers of nutrition. Principally it is consequent upon disuse. The value of exercise in developing the bones of such a limb can hardly be overestimated.

The influence of exercise upon the internal organs is in no wise different from what it is for normal individuals.

The beneficent influence of exercise, particularly upon the minds of older persons who have become paralyzed, should never be overlooked. For them exercise stands in the relation that games do to healthy persons. And the improvement in spirits and enjoyment of life is said to be out of all proportion to the muscular control gained.

Ideally the orthopedic surgeon should himself prescribe and personally supervise the exercise treatment, both in developing to the utmost the remnant of his patient's muscular power, and after an operation for muscle transference, in training the transferred muscle in the performance of its new function. Unhappily this is for financial or social reasons usually impracticable. However, it implies that he should study each individual case for itself; that he must have recognized to what extent muscles and nerves have been affected; that he must appreciate the mechanical possibilities and limitations of the joint, and the general condition of the patient. Particularly must he guard against injuring the delicate nerves, muscles and joints through misdirected zeal. Next to caution must he exercise patience. Results come slowly, so slowly indeed that during the first few months improvement can be recognized only if a written record be kept of the ability to perform motions before and after given intervals of time.

The tension of the muscular tissues merits special consideration. Sometimes recovery is hastened by employing apparatus to hold the limb so as to relax the affected muscles. At other times this may best be accomplished by tenotomizing their antagonists. This feature will be considered more fully later.

Technic. Whenever the peripheral motor end neurons are affected, as in spinal poliomyelitis, the greatest care must be taken not to injure the delicate and now specially vulnerable neuro-muscular apparatus.

We have already said that authorities are agreed that for the first 3 or 8 weeks following the invasion no stimulation at all should be employed and that during the following months it should be used with great care. Throughout treatment the following rule should be complied with in exercising a muscle: "Exercise to the point of moderate fatigue makes for improvement both in the quality and quantity of a muscle. Exercise beyond this point is harmful to a muscle."

The manner in which exercises are performed is of scarcely less importance than the determination which exercises to perform. Therefore the physician should not content himself with saying flex this or abduct that so many times. He should also prescribe the position in which the limb must be held before attempting to perform the exercise, the amount of outside support to be afforded the limb during the performance of a given exercise and the arc through which an exercise should be carried out.

For example, adduction and abduction exercises are easiest performed when the patient is emersed in the bath. For flexion and extension exercises the resting part of the body should be horizontal and the active part vertical or nearly so. For example: The muscles of the knee are best exercised with the patient lying face down with his knee flexed. Particularly in performing exercises of the hip and shoulder is support necessary.

Almost always treatment begins with passive exercises. At least twice a day each joint should be carried in every direction to the limit of normal motion. There is an exception to this rule, however. When the prolonged maintenance of a limb in one of the extremes of motion at a given joint has made it probable that certain muscles are overstretched, once this distortion is overcome under no circumstances should the posture be again permitted even for an instant.

At first single muscles or groups of muscles should be exercised. Later simple movements and then combined movements may be attempted.

Symmetrical exercises are of exceptional value when the paralysis has involved only one side. The writer has found these—especially in very young children—of the greatest service. The duration of treatment must vary with the case. Where extensive paralyses, especially paralyses of the upper extremities, have occurred, the exercise treatment should be maintained until there is no longer any evidence of further improvement.

On the other hand where time and expense are factors to be reckoned with and where an operation or a brace will give a permanently serviceable limb their employment is indicated.

Braces. We come now in the natural order of events to a consideration of the place occupied by braces in the treatment of spinal poliomyelitis.

Perhaps no one subject calls for clearer thinking nor franker discussion than this one. Properly applied a brace fulfils an important requirement in the course of treatment. Frequently it is made the means of cloaking ignorance, or at best hazy thinking on the part of the medical attendant, and, being improperly applied, works a very real harm to the patient.

The indications for wearing a brace before operation are first, to prevent deformity and second, to improve function; after operation it is properly employed to prevent the newly adjusted and still insecure operation field from being subjected to strain.

The tests of the efficiency of a splint when applied are found in the answers to the questions: 1. Does it actually prevent deformity? 2. Does it really improve function? 3. Does it in fact relieve strain? 4 (and most important). Is the limb as a whole going to be permanently benefited by its use—or is it not? The significance of the last question should not be overlooked. There are a variety of braces—especially among the sheath splints—which, while causing an immediate improvement in function, eventually bring about an atrophy of whatever muscle tissue may still be active. Such braces are to be avoided.

A brace should be made according to the attending physician's prescription; and, as in other prescription writing, it is as important to know what not to prescribe as it is to know what will benefit the patient.

In order to prevent haziness of thought a physician about to prescribe a brace should *put in writing*: 1. *What* breakdown or defect in a motor mechanism he aims, by means of the brace, to compensate; 2, *how* he proposes to make the brace do this. 3. He must then be prepared to sketch or to cut out of wrapping paper patterns of the several parts of the brace and to append the different outlines or dimensions. 4. Finally, when the brace is on he must be *able* to answer the question, *Does it, or does it not, accomplish* what it was designed to accomplish?

From the foregoing it will be evident that to make the most of a brace implies first of all, a working knowledge of anatomy, of physiology and of the pathology of the disease in question; secondly, it calls for some mechanical imagination; and thirdly, for sufficient manual dexterity to be able to fit a brace once it is made. The technical skill necessary to the actual construction of apparatus is not essential to enable one to prescribe it.

I have failed of my purpose if I have not yet made it clear that the prescribing of braces is as much physician's work as is the prescribing of medicines and that, as some one has aptly said, the physician who is so unmindful of his obligations as to send his patient to an instrument maker to be supplied with whatever apparatus the latter may select is in no wise different from a physician who would send a patient to a druggist with the request that the druggist prescribe for him.

The preceding paragraphs were submitted to a maker of orthopedic apparatus. That he recognized the distinction made is shown by his commentary. He said, "Doctors send patients to me for braces that will make them walk better, and I do it, if not with one kind of brace then with another. But what the final effect of a brace like, say, a Hessing" (sheath splint), "will be upon the leg as a whole, I cannot say. I never had time to read up anatomy, or diseases. Anyway, that's up to the doctor. I'm not a doctor, I'm a mechanic." It is to be regretted that a portion of the profession have failed to recognize the distinction which this mechanic sees so clearly.

The use of braces is almost wholly confined to the lower extremity and when simplified to types they are so few in number that I shall ask your indulgence while I indicate them.

In the foot, assuming that no inflexible deformity be present, we first accomplish all we can by balancing the foot under the leg. If this prove inadequate we augment it with a simple bar up the leg, a calf band, and perhaps a rubber muscle.

Let us take, for examule, the type of foot which presents a paralysis of the anterior and posterior tibial muscles. The unopposed tension of the peroneals tends to pull the forefoot over into pronation. To oppose this tendency, we introduce a valgus wedge into the shoe to support the relatively high and unstable internal longitudinal arch. The inner side of sole and heel of shoe are also raised while the heel itself is flanged inward and at the same time advanced so as to support the shank.

Should these measures prove to be inadequate it will be shown by the way the sole of the shoe wears out. In such an event in addition to the foregoing we carry a bar up the outer side of the leg. Its upper end ends in a padded calf band just below the head of the fibula. The lower end turns at a right angle to enter deeply a round socket in the outer side of the heel. A roughly quadrilateral piece of leather is sewn by its lower border to the inner side of the shank of the shoe. Its two upper corners are prolonged in straps which, passing one in front and the other behind the ankle, pass around the bar and on being buckled pull the ankle over toward it, thereby causing the foot to assume the position of supination. A rubber muscle from the inner side of the forefoot to the calf band may help to maintain dorsal flexion. Not infrequently the patient persists in walking with such a foot turned outward so that the instep looks forward. The rotation occurs in the hip joint. In such an event in order to control the rotation and to maintain the foot looking forward it is necessary to prolong the bar upward until it attaches to a padded pelvic band. It will be necessary to have the bar jointed at the knee and at a point just below where it attaches to the pelvic band.

For correction of the supinated position consequent upon paralysis of the peronei one uses braces and measures which reverse the strains exerted by those just described.

For dropping of the forefoot consequent upon paralysis of the dorsal flexors, a simple and efficient apparatus consists of two uprights united below by a plate which screws to the sole of the

shank of the shoe, or they may be united in a sole plate to be worn in the shoe. Above the uprights are united by a broad calf band. Opposite the ankle are joints which admit of unlimited dorsal flexion but which lock when the foot is at right angles to the leg, thereby preventing further plantar flexion. Rubber muscles reaching from either side of the forefoot to attach to each calf band may or may not be added.

For the reverse condition of calcaneous or heel drop no braces prove satisfactory. Feiss' modification of Whitman's calcaneous brace is perhaps the best.

For quadriceps paralysis, a caliper attaching below to the heel of the shoe in the manner first described, and united above by a broad band just below the gluteal fold represents the type of brace indicated. A knee cap or a broad strap just above the patella attaches to either leg of the caliper and prevents flexion at the knee.

It is often desirable that the affected limb should be maintained during the sleeping hours in the over-corrected position. This is best accomplished by means of sheath splints made on over-corrected plaster models of such limbs. However, such splints should not be laced tightly enough to compress the limbs.

The Third Stage.

It is estimated by some writers that as high as 80% of the victims of spinal poliomyelitis present permanent paralyses of one or more muscles. Whether or not this estimate be excessive, certain it is that the percentage of those affected is very high.

When after a year (Robt. Jones says two years) it is apparent that further improvement may not be expected to follow a protraction of conservative treatment the question arises whether function might not be still further improved by operative interference.

The lines of treatment which have then to be considered are 1, nerve anastomosis; 2, tendon grafting; 3, tendon transference; 4, arthrodesis; 5, the use of intra articular silk ligaments.

Nerve Anastomosis (Spitzy et al.).

In theory the form of operative treatment which most ideally meets the requirements of spinal poliomyelitis is nerve fusion, or nerve anastomosis. This method aims to supply the nerve of a paralyzed muscle, or group of muscles, with fresh axis cylinders by grafting or fusing it with a nerve trunk known to be healthy.

In actual practice this operative principle has not worked out satisfactorily. A few cases have been reported where the operation has been followed by muscle regeneration; but a critical analysis of such cases has not shown that under proper treatment these particular patients might not in time have recovered without operative interference. On the other hand great numbers of cases have been observed in which the operation was without beneficial result and relief had to be sought through other means. Finally in the attempt to recuperate by this method nerves which have suffered from the disease there is the ever present danger of dissipating whatever power may be left in the uninjured nerve trunks. Therefore, while it has been under consideration for nearly a decade nerve anastomosis cannot at this writing be given preference in the treatment even of selected cases of spinal poliomyelitis.

Tendon Grafting (Nicoladoni, Vulpius, Codivilla et al).

The tendon graft was introduced by Nicoladoni about three decades ago. The fundamental principle underlying operations based upon this plan was that each paralyzed tendon must be attached to an actively contractile muscle.

This method is not free from serious objections, however. First the necessity for supplying each paralyzed tendon with active muscle substance frequently implies very complicated operation plans, and whenever paralyses are at all extensive, the attachment of the tendons of antagonistic muscles to the same source of power. When tendons which exert opposite pulls are attached to the same muscle belly, the power generated by a contraction of the latter, being exerted at the same time in opposite directions, must inevitably neutralize itself, and prevent rather than inaugurate motion.

Again where the problem has been sufficiently simple to permit the tendons of paralyzed muscles to be supplied with independently contractile muscle substance, it was matter of general and recurring comment that what had at first appeared to be a truly brilliant result gradually, under the influence of functional use disappeared, while the limb relapsed into a condition approximating the original defect. A great many causes for this failure have been suggested. The one which subsequent operations have shown to be most constant was the disposition of the paralyzed tendon to stretch between its insertion and the site of its attachment to the healthy muscle. The method has, however, a limited field of usefulness in operations upon the forearm and hand where the causes of disability were other than the lesions of spinal poliomyelitis.

Tendon Transference (Lange).

The method of Lange differentiates itself from all others in that it takes no account of the paralyzed muscle nor of its tendon. It attempts to improve the function of a paralyzed limb by a redistribution of the remnant of its mucular power. It aims to free the tendon of a healthy muscle from its insertion and to reattach it at that bony point where it will best do the work that had been done by the paralyzed tendon before the invasion of the disease. In this way, too, the muscular balance normally present about a joint and which had been upset by the paralysis, is again established.

It should be clearly understood, however, that no operation will augment the sum of the muscular power left active by the disease. If it does anything at all, operative interference will diminish that sum. All that can be accomplished by operative means, aside from overcoming deformity and

obliterating uncontrolled motion, is to transfer part of the power which had been pulling a limb into distortion to a point where it will oppose the pull of the active muscles which have been left undisturbed.

Our recognition of the value of this method is not a new departure. Nearly a decade ago, on the twenty-third day of April, 1903, in an address before the California State Medical Society, the writer said:

"The object of the present paper is to direct attention to a rational and efficient method of treating a group of cases which has proved intractible to other methods of treatment."

In that paper was described for the first time in America, the so-called "periosteal implantation method" of Lange. Since then this method has received such universal acceptance among orthopedic surgeons that already in 1910, Lovett of Boston, was able to obtain over forty answers to the following questions he had sent out in the form of a circular letter to the active members of our orthopedic association. These answers he made the basis of a report delivered in the same year before the World's Medical Congress at Budapest. I quote from Lovett's report:

(To be continued in the October, 1913, issue.)

A REVIEW OF BLOOD CHANGES THAT MAY ASSIST IN THE DIAGNOSIS OF CANCER.*

By SURGEON DONALD H. CURRIE, United States Public Health Service.

Several weeks ago a patient entered the Marine Hospital of this City, complaining of a progressive loss of weight and strength, accompanied by extreme pallor. Clinical examination showed a non-pulsating tumor of the epigastric region, and but little else. On account of the appearance of the man together with a tumor of the region mentioned, an analysis was made of the stomach contents obtained after the ordinary Boas' test breakfast, although no gastric symptoms were complained of. Hydrochloric acid was found to be absent in the contents, but no lactic acid was present. This test was repeated with the same result. An examination was made of his feces for bacilli of the Boas-Oppler type without any definite results. An examination of the blood was made which showed the following conditions: Hemoglobin 27%; red cells 2,848,000, white cells 9300, of which 10% were lymphocytes, 84% polynuclear cells, and 6% basophiles and large mononuclear cells. Of the red cells one normoblast was noted, while microcytes were numerous. There was no general increase in the size of the red cells and, with the exception of the microcytes mentioned, no marked variation between the sizes of the several red cells. The red cells showed marked diminution in the amount of hemoglobin, being extremely pallid.

This anemia, of a secondary type, notable for the deficiency of its hemoglobin in proportion to the corpuscles, accompanied by a slight degree of polymorphonuclear leukocytosis, while by no means completing the diagnostic evidence, when taken with the other symptoms appeared to justify us in recommending an exploratory operation with the expectation of finding a malignant growth. This was done by Surgeon Woodward of the Marine Hospital and an inoperable carcinoma of the stomach discovered.

This case coming, as it did, on the heels of a very similar case several weeks before, impressed upon me the extremely unsatisfactory nature of the symptoms of some of these cases of malignancy of the viscera, when the ordinary methods of examination and tests are conducted—for even when the stomach is involved, the examination of its contents is often inconclusive; the examination of the feces frequently reveals more Gram-fast bacilli than one would expect in health and yet not a sufficient increase of their numbers to justify definite conclusions; and all cases do not have a tumor, as this one did, to assist one in reaching an opinion.

Impressed by these facts and, in order to be better equipped for furnishing a more definite opinion on the next case of visceral malignancy, I turned my attention to the literature of recent methods of blood examination for the diagnosis of carcinoma, and have carefully reviewed this subject as far as the American and European literature accessible to me would permit. In collecting data of this kind we did not hope to find any single test described which would diagnose malignancy with certainty, but it was thought possible that, by collecting together data on all the methods of examination that have been described for detecting changes in the blood, and by the employment of the several of those that appeared to have the greatest utility, we might be able to lay before the clinician a blood picture, which in its entirety would be very strongly diagnostic of this condition and, by considering such a picture together with the clinical symptoms of the case, would permit him to make the ante-operative diagnosis with a fair degree of certainty. I had hoped after getting together these data to be able to test them out on cases at the Marine Hospital and later present a paper to this Society that would embody both the findings of others and the results of my own application of such findings.

I was, however, at this time requested to present a paper on this matter at this meeting, and while loath to submit an article based entirely upon literature without citing any personal experience, I, after consideration, decided to do so under the belief that it might sufficiently interest some other laboratory workers of this Society, whose opportunities and clinical material are greater than mine, to carry out a similar line of work.

The first step in approaching this subject was to make a preliminary review of the literature bearing on it; from these writings it was found that

* Read before the San Francisco County Medical Society, May 6, 1913.

the below given changes in the blood of carcinoma patients have been described by various observers:

1. Anemia of a certain type;
2. Moderate leukocytosis of a certain type;
3. Changes in specific gravity;
4. Changes in reaction;
5. An excess of sugar;
6. The power to deviate complement;
7. Hemolytic properties;
8. Antitrypsinic properties;
9. Precipitin properties;
10. The peculiarity of reacting to the Meiostagmin test;
11. The absence of the property possessed by normal serum of dissolving cancer cells.

I shall consider each of these in detail:

I. *Anemia*: It has been well established for a number of years that in the late stages of carcinoma anemia of a secondary type, and especially a hemoglobinemia, is a fairly constant condition in carcinoma. When it comes to anemia in the earlier stages of the disease—the stage it is important to make a diagnosis in, the reports of various observers differ on the degree and constancy of the symptom. From the study of such opinions it appears, however, that in the earlier stages of the disease, the anemia, as a rule, is quite constant although not of a great degree. There are exceptions to this, however, and advanced degrees of anemia may precede recognizable growth. On the other hand, in the early stages, while the anemia is not of a high degree, a certain amount of it, and especially a certain loss of hemoglobin, is such a constant symptom that a full red blood corpuscle count, with full amount of hemoglobin almost excludes malignancy, and Keith states that he has never personally observed a normal blood in a case of carcinoma. Several factors influence the degree of the anemia present, notably the position of the tumor as well as the rapidity of its growth.

In the great majority of the cases the anemia is clearly of the secondary type and if it possesses any peculiarity it is in the low hemoglobin index, even when compared with other secondary anemias. Occasionally, however, the blood may approach the appearance seen in pernicious anemia in many respects, although the high hemoglobin index of that disease is rarely met with. The closest approach to the blood of pernicious anemia is stated by Harrington and Kennedy to be met with in carcinomatous metastasis of the bone marrow, so much so that when the blood presents this peculiarity in a case where the diagnosis of carcinoma has already been made, these authors feel justified in adding to this diagnosis that the tumor has been followed by a secondary metastatic involvement of the marrow.

II. *Leukocytosis*: Very recent literature appears to be remarkably meager on the subject of leukocytosis in malignancy, but going back further in recorded laboratory experiences, it appears to be generally accepted that a moderate but distinct leukocytosis, peculiar in a relative increase in polymorphonuclear cells, is present in the great majority of cases. Exceptions are rarely met with, and among these a leukopenia has been recorded, as well as a relative increase of lymphocytes instead of the usual increase, of polymorphonuclear cells. Eosinophiles usually remain in their normal proportions, and myelocytes frequently are present in the late stages of the disease.

While leukocytosis is quite constant, the *degree* of it is subject to marked variation, and apparently depends chiefly upon the rate of the tumor's growth, the type it belongs to, its location and the presence or absence of ulceration.

III. *Changes in Specific Gravity*: It appears to be well established that in the late stages of carcinoma there is a marked and peculiar lowering of the specific gravity of the patient's blood out of all proportion to the anemia (comparing it to other forms of anemia). If this phenomenon occurred early, it might have diagnostic value, at a time when it would be of use to the clinician, but unfortunately for purposes of diagnosis, the specific gravity of the blood in early carcinoma is usually the same as in other forms of secondary anemia, and in proportion to the degree of the latter.

IV. *Changes of Reaction*: The reduction of the alkalinity of the blood in carcinoma is in proportion to the amount of anemia present and differs in no respect from the changes in other forms of secondary anemia.

V. *Excess of Sugar in the Blood*: This condition has been described as frequently present in carcinoma, but it is by no means a constant change and is met with in other pathological states.

VI. *Complement Fixation*: In considering this subject we must separate the complement fixation tests that have been made with the serum of carcinoma patients using *syphilitic* antigen, in other words, the Wassermann test, from those attempts that have been made to diagnose carcinoma by an analogous test to Wassermann's, in which an extract of a carcinoma was employed as the antigen.

Scattered through the literature of the Wassermann reaction there will be found an occasional reference to a case of malignant tumor in which Wassermann's reaction was positive. Even allowing for the possibility that some of these patients are syphilitic and the variations in the technic of these tests, it would still appear probable that one of the sources of error of Wassermann's reaction is that it may occasionally be given by a case of carcinoma. This is of no diagnostic value for carcinoma, its only interest being to lessen to a slight degree the reliability of the Wassermann test in syphilis.

Of the recent writers the only one that I am familiar with who claims that a large percentage of carcinoma patients give a positive Wassermann reaction is Caan, who secured positive Wassermann reactions in 41% of the carcinoma patients' blood examined by him. Recently Newmark reported before this Society a similar case of a patient suffering from carcinoma, whose blood gave a positive Wassermann reaction in the hands of several competent laboratory diagnosticians. On the other hand, Bruggemann, reporting on 175 cases suffer-

ing from carcinoma, found that negative Wassermann reactions occurred in all of the cancer cases' serum if the patient was non-syphilitic.

Rosenberg reviews the work of several investigators who have used the carcinomatous extract as the antigen for a test analogous to Wassermann's. He refers to the work of Ranzi (1906) as the first man to employ this method; but Ranzi's results were entirely unsatisfactory. He likewise mentions the work of Tedeschi who also failed to secure positive results, as did a number of subsequent workers. He then analyzes the recent investigations of von Dungern who reports on the examination of 42 cancer patients' blood in which he claims to have secured positive reactions by the use of carcinomatous extract for antigen. Rosenberg then cites his own experiments undertaken along the line pointed out by von Dungern, in which he also examined 42 cases of carcinoma, controlling his experiments with the blood of 73 persons suffering from other diseases. He concludes from his results that cancer patients' serum gives a complement fixation with alcoholic carcinomatous extract more frequently than other patients do, with the exception of those suffering from syphilis, but positive reactions are not the rule in cancer patients, while positive reactions are only a little less frequent in patients suffering from certain other diseases, and he therefore does not consider complement fixation tests with the carcinomatous extract as antigen, as having any value for the clinical diagnosis of carcinoma.

Sittenfield dismisses this class of tests as of no use in the diagnosis of carcinoma, stating that Wassermann's reaction is occasionally positive in carcinoma, but without diagnostic value, while Wassermann's technic with cancerous extract as antigen gives very uncertain results.

VII. *Hemolytic Properties*: It was observed a number of years ago (Ewing, Clinical Pathology of the Blood, 1903) by numerous investigators that the serum of carcinoma patients was capable of killing animals when injected into them, their death being accompanied by great destruction of red cells. It has also been shown that the serum of such patients will destroy the normal human blood corpuscles while it is without effect upon the red cells of a cancer patient's blood. In more recent times several investigators have attempted to apply this principle for the diagnosis of cancer; one group of these investigators have followed the lead of Elsberg and injected normal washed human corpuscles under the skin of carcinomatous patients, detecting a few hours afterwards the hemolysis by varying shades of brown, yellow and green areas, appearing on the skin about the site of inoculation. Others have performed their test *in vitro,* using either the normal human blood corpuscles, or, following the modification of Kelling, the corpuscles of a hen, as an index of the presence of hemolysins in cancer patients' serum. Among the results recorded in the more recent literature may be mentioned the following:

Risley employed Elsberg's test which he describes as follows: Inject five drops of a 20% suspension of washed normal red corpuscles in the subcutaneous tissue of the forearm of the patient; before 12 hours a raised area, varying in color from a brown to a yellowish-green, makes its appearance and disappears on the following day. Of twenty-seven cases of cancer which he tested, only 9 gave a positive reaction while of the 73 patients suffering from other diseases, 15 gave a positive reaction. The author concludes that for the present, at least, the test is without diagnostic value.

Warfield employed Elsberg's test in a group of carcinoma cases but only succeeded in getting positive reactions in one-third and believes the test of little value for the early diagnosis of carcinoma.

Lisser and Bloomfield employed Elsberg's test with the modification that they took the precaution to use only corpuscles which were neither agglutinated nor hemolyzed by any sera *in vitro.* Employing this technic they found that in 62 cases of malignant growth two-thirds gave positive reactions and one-third were negative. In 94 control cases 92% were negative and 8% were positive. The authors conclude that a negative skin reaction is of little value against cancer, but on the other hand, a positive reaction is strong presumptive evidence that the patient is suffering from carcinoma, but they insist that one must only employ corpuscles of certain persons, i. e., corpuscles showing neither sensitiveness to agglutinins or hemolysins in the test tube.

Sittinfield considers the subject of hemolysins in cancerous patients' serum as yet in too unsettled a state for practical use in the clinic.

Gorham and Lisser compare the skin reaction of Elsberg to the reaction of hemolysins *in vitro;* they conclude that the test tube method has little diagnostic value and that there is no relationship between the skin test and the test tube reaction. They found that the skin reaction is positive in 60% of cancerous patients and negative in most other diseases, and they therefore conclude that a positive skin reaction is diagnostic in cancer patients; but that a negative reaction is without value.

As previously mentioned, the test for hemolysins in the carcinomatous patients' blood, *in vitro,* has been attempted, using both human corpuscles and the corpuscles of the fowl. The latter was first employed by Kelling as follows: The patient's serum is heated to 55° C. for 30 minutes, when ½ cc. of it is added to 1 cc. of a 5% suspension of hen's red corpuscles in normal salt solution. The mixture is incubated at 37° C. for one hour, the sensitized corpuscles centrifuged out and washed in salt solution, after which 0.5 cc. of normal active human serum is added together with 1½ cc. of normal salt solution. This tube is then incubated for a definite time, which must be previously worked out by the use of controls. At the end of this time the amount of hemolysis is judged and compared to the amount that may have occurred in the controls, containing only inactivated serum and corpuscles.

The same author later writes on the subject and reaffirms the diagnostic value of this test after an experience with 200 cases of carcinoma.

Bruggemann tabulates his findings with Kelling's hemolytic test in 175 cases of which 40 cases were suffering from cancer. He obtained positive reactions in 72% of these latter patients. On the other hand, among the remaining 135 cases of other diseases, positive results were sometimes obtained, but only in a single instance was both Kelling's hemolytic test and Ascoli's meiostagmin test positive in the same patient, while of his forty carcinoma patients Kelling's test was positive in eight alone, both Kelling's and Ascoli's tests were positive in 12, while Ascoli's surface tension test, to be later described, was positive in 9 alone.

Crile finds that cancer patients' serum hemolyzes normal red human corpuscles in a large majority of his cases.

Krokiewicz finds that patients suffering from carcinoma have substances in their blood serum that are capable of hemolyzing normal washed blood cells, if the serum is added in very small amounts. If an overdose of the serum is employed, deformity of the blood cells results without actual solution of them.

Weil, referring to the hemolytic test, *in vitro,* with human corpuscles, as well as Moss, three years later, both state that such tests are of little value in diagnosis.

Krida collected together statistics of 1812 observations made by ten workers on hemolysis of cancer patients' serum tested *in vitro.* Of these patients 472 were suffering from carcinoma, and of these carcinomata cases 67% gave positive reactions. Of those suffering from benign tumors, on the other hand, only 1% gave positive reactions. Of various diseases, exclusive of tumors of all kinds, 509 cases were tested and 14% of them gave positive reactions.

It will be seen from the above references, in tests for the hemolysins in carcinomatous patients' blood, the test by means of a skin reaction using human corpuscles, the test, *in vitro,* with human corpuscles, and the test, *in vitro,* with hen's corpuscles, must each be judged separately; it is not clear from the abstract at hand of Krida's work, valuable though it is, from the immense number of cases tabulated, that he separated the tests made with human corpuscles from those in which Kelling's technic was employed.

VIII. *Antitrypsinic Properties*: Brieger and Trebing found that normal blood serum contained sufficient antibodies to inhibit the digestive action of a 1% solution of trypsin on the Loeffler plate in the proportion of 1:3, although in some cases a dilution of 1:6 would accomplish the inhibition, while in such diseases as diabetes and tuberculosis a proportion 1:7 or 1:8 gave the reaction. On the other hand, the inhibiting power of the serum was very much increased in 35 cases of cancer, solutions as weak as 1:10 or 1:20 were effective in the majority of cases. In cases of cancer that had been operated on, the normal ratio was found to be again present. The authors thought this trypsin reaction may aid in the diagnosis of carcinoma, although not specific in character, but merely denoting the amount of inhibiting power in regard to trypsin. It has also been observed in certain blood affections.

Roux and Savignac describe their technic (which is a modification of the one first employed by the last named investigators) for testing the antitrypsinic power of cancerous patients' blood serum. They mix equal parts of milk and 2% agar, filter hot and pour into Petri dishes. One drop of patients' serum is then mixed with 1, 2, 3, 4 and more drops of 1% trypsin and a drop of each dilution placed on the media; they then incubate each for one hour at 50° C., to determine the index which is required to overcome the antitrypsinic power of the serum, four drops is the highest normal range and above this is strong evidence of malignancy. They refer to a similar work performed by Müller. Their results are 89% positive of 53 cases of certain carcinoma, and 80% positive among suspected cases of carcinoma. While this reaction is met with occasionally in other diseases, it is usually in cases where the question of carcinoma would not arise.

Shaw MacKenzie calls attention to the antitrypsinic condition of cancer patients' blood and believes it to be an aid in the diagnosis.

Pinkuss finds a negative antitrypsinic reaction can be depended upon to exclude cancer, but a positive reaction is occasionally met with in diseases accompanied by leukocyte destruction. Positive reactions should therefore only be considered as confirmatory evidence in connection with the whole picture of the case.

Sittenfield, in an article reviewing the various tests that may be of use in the diagnosis of cancer, states that 92% of cancer cases show a positive antitrypsinic reaction. Other diseases sometimes give the reaction also, therefore a negative reaction excludes cancer almost certainly, but the contrary is not entirely true.

Frankel, Von der Heide and Krosing report 90% positive results with this test in carcinoma cases.

IX. *Precipitin Properties*: Freund and Kaminer have devised a test of cancer patients' serum and tried it out on 250 patients with positive results in all except 11 cases. In performing this test they prepared a suspension of cancer cells in salt solution, centrifuged them off and effected their solution in acetic acid. They added this extract to the patients' serum, securing a precipitate if the patient is suffering from carcinoma, while the serum of patients suffering from other diseases, or normal patients' serum, remained clear after the addition of the extract.

Sittenfield considers that the precipitin test of Freund and Kaminer has given very encouraging results, and up to the time of his writing, 82% of recorded cases that have been tested by this method have given a positive reaction.

X. *The Meiostagmin Test*: Ascoli discovered a new phase of immunity reaction which is physio-

chemical in nature, and consists in the determination of the surface tension of an immune serum plus its antigen before and after incubation at 37° C. for two hours. He employed the stalagmometer of Traube for measuring the surface tension and by this means was able to determine exactly the number of drops in a given quantity of fluid.

Arzt and Kerl tried out the Meiostagmin reaction on three groups of cancer patients with the following results:

399 cases.....83% positive;
100 cases.....93% positive;
53 cases.....83% positive,

while of patients suffering from non-malignant conditions the following results were secured:

548 cases..... 9½% positive;
16 cases.....12½% positive.

Stammler considers the Meiostagmin reaction the most valuable of the several serological tests for carcinoma, and found that 83 of 100 cancer cases gave the reaction, while only 14 out of 140 cases of other diseases proved positive.

Monakow reports reliable results with this test.

Kelling reports that he secured 47% positive reactions by the use of this test in 45 cases of carcinoma, and only in 3 out of 85 cases of other diseases. Some of the carcinoma cases gave the reaction very early in the disease. He further finds by paralleling this test with his hemolytic test, that it is possible to secure a positive reaction, by one or the other, in 80% of cancer cases and in a very small percentage of patients suffering from other diseases.

Kraus, Graff and Ranzi review the work of others in the serological tests for cancer and conclude that most of such tests are of little value, but on the other hand the Meiostagmin test is very reliable and in their personal experience only caused error in two out of twenty-six cases.

Leidi reports, that of twenty cancer patients sixteen showed a positive Meiostagmin reaction, while of twenty-four patients suffering from other diseases only two gave the reaction.

Stammler reports on 340 patients with various diseases, including 120 cases of cancer. In the latter he secured 73% positive reactions with this test, while 20% of other diseases gave a positive reaction, but of the latter most of the patients were suffering from diphtheria, scarlet fever or diabetes, none of which conditions would be apt to be confused with carcinoma.

Izar (a pupil of Ascoli) reports on certain technical improvements in this test, which makes it easier and more reliable. He experimented especially with the antigens it was possible to employ. The antigen first used by Ascoli was a crude pancreatic extract, and Izar finds that in addition to this one can employ purified pancreatic extracts by the use of alcohol, ether and acetone. In addition to these a number of substances may be employed as antigen, such as peptone, albumose, trypsin, kasein and kyrin.

Kohler and Luger employed this test with a slight modification in the antigen, using the commercial lecithin, which they purified by washing in acetone for twenty-four hours.

Bruggemann secured very satisfactory results with Ascoli's test, but regrets that, owing to the unstable nature of the crude pancreatic antigen, the test is a difficult one. When writing this, however, the author evidently was not familiar with the improvements in the antigen that had been made by Izar.

XI. *Absence of Property Possessed by Normal Serum to Dissolve Cancer Cells*: Neuberg observed that cancer cells in suspension in salt solution are dissolved when they come into contact with the normal human serum, but that this solution does not occur when the same are brought into contact with the serum of cancerous patients. I have been unable to find any reference to the work by others that would tend to prove or establish this claim.

Discussion.

From the above it will be seen that a number of changes have been described in cancerous patients' blood. Some of these, for one reason or another, are not of practical value in the diagnosis of the condition. Notably is this true of changes in the specific gravity, in reaction, in excess of sugar content and the alleged power of such serum to deviate complement.

On the other hand, the anemia, the leukocytosis, the hemolytic properties, the anti-trypsinic properties, the peculiarity of reacting to the Meiostagmin test, and possibly the precipitin reaction as well as the absence of power to dissolve cancer cells, are changes that offer hope of assisting in the diagnosis of this condition.

Some of these changes, like anemia, leukocytosis, the Meiostagmin and antitrypsin tests, appear to be already well enough established to be of practical utility to the clinician, either in a negative or positive way. On the other hand, the hemolytic properties (and just what method is best to employ in testing such properties), the absence of power to dissolve cancer cells, as well as the precipitin test, while they may later prove of value, are, it would appear, as yet in an entirely experimental stage.

Weighing all of these data and opinions presented by the writers above referred to, it would appear to me that even in our present state of knowledge, the employment of a combination of the better established of these tests would probably give a picture that, in its entirety, would be of much assistance in the diagnosis. The great advantage of tests of the class just enumerated is, that what diagnostic value they have is possessed for carcinoma in any location, while the tests of the gastro-intestinal contents are at best only of use for carcinoma of the stomach, and in carcinoma of other viscera we have been forced in the past to depend entirely upon clinical symptoms.

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IN MEMORIAM.

Ralph S. Lavenson.

Ralph S. Lavenson, M. D. Born at Sacramento. Attended Sacramento public schools and the University of California. Received the M. D. degree from the University of Pennsylvania in 1902. Post-graduate work at Vienna. A fellow of the American Medical Association; a member of the Medical Society of the State of Pennsylvania and Medical Society of the State of California; formerly assistant medical director of the Philadelphia General Hospital; assistant demonstrator of pathology in his alma mater; associate in medicine in the William Pepper Laboratory of Clinical Medicine; instructor in medicine Los Angeles Medical Department, University of California. Died at his home in Los Angeles, July 4th, from tuberculosis, aged 36.

Whereas, It has pleased Almighty God in His infinite wisdom to remove from us our beloved Colleague, Ralph S. Lavenson, and

Whereas, In the death of our frater we have lost a colleague who exemplified in his life the noble principles of our profession, and

Whereas, In his loss the members of the Los Angeles County Medical Association have been deprived of a loyal colleague and true friend; therefore, be it

Resolved, That we, as individuals and as an Association, extend our most heartfelt sympathy to the family of our departed brother in their bereavement; and be it further

Resolved, That a copy of these resolutions be sent to the bereaved family, and be published in the Bulletin of the Los Angeles County Medical Association, the Journal of the California State Medical Society, and be inscribed in the minutes of the Association.

SOCIETY REPORT

CALIFORNIA ACADEMY OF MEDICINE.

A meeting of the Academy was held on the evening of July 28th, at which the following program was given.

1. Two unusual Cases of Asthma. H. I. Wiel. Description of Surgical Procedure in one of these Cases. L. Eloesser.
2. The Toxic Effect of Salvarsan. G. E. Ebright. Discussed by L. Schmitt, R. Brooke and Harry E. Alderson.

Refreshments were served at the close of the meeting.

PROCEEDINGS OF THE SAN FRANCISCO COUNTY MEDICAL SOCIETY.

General Meeting, Tuesday, June 10th.

1. Intestinal Bilharziasis. (Illustrated by Specimens.) Herbert Gunn.
2. Coccidioidal Granuloma—A Case Report. (Demonstration of Specimens.) W. T. Cummins and G. R. Carson.
3. Report of Case of Coccidioidal Granuloma. P. K. Brown. Discussed by Douglas W. Montgomery, P. K. Brown and W. T. Cummins.

SAN JOAQUIN COUNTY.

The regular monthly meeting of the San Joaquin County Medical Society was held June 27th at the Dameron Hospital. The following members were present: Drs. C. F. English, J. D. Dameron, H. E. Sanderson, Mary Taylor, B. F. Walker, C. R. Harry, L. R. Johnson, Hudson Smythe, L. Dozier and R. T. McGurk, with Dr. Davison as guest.

A paper entitled "The Laboratory and Its Uses to the Physician" was read by Dr. L. Dozier. The subject is a very interesting one and the paper was greatly enjoyed by the members. Dr. Dozier gave a very excellent résumé of the various laboratory methods and concluded with his own deductions as to the value of each, bringing out especially the value of the Wassermann, and also reminding the members of the advisability of Retinoscopy as a final check in suspected syphilitic lesions.

After the discussion of Dr. Dozier's paper, the society took up the question of the city bacteriologist, of which this city is greatly in need. Every one agreed that time would so emphasize the necessity of this position so emphatically that it would finally be created.

There being nothing more to come before the meeting, the society adjourned, the next meeting to be held the last Friday in September.

R. T. McGURK, Secretary.

ST. FRANCIS CLINICAL SOCIETY.

A meeting was held on the evening of Friday, July 25th, at which the following program was given:

1. Presentation of a Case of Fistula of Labyrinth (due to tubercle bacillus).
2. Case of Spontaneous Gangrene, or Raynaud's Disease. Dr. W. B. Coffey.
3. Some Observations on the Use of Phylacogens in the Treatment of Surgical Infections. Dr. B. F. Alden.
4. Clinical Observations on the Use of Phylacogens. Dr. W. B. Coffey.

Discussed by Drs. Artigues, Fischer, Bacigalupi, Spiro, Rothschild, Gardner, Hogan, O'Connor, Austin, Wymore, Alden, and Coffey.

Refreshments were served at the close of the meeting.

BOOK REVIEWS

The Diseases of the Rectum and Pelvic Colon. By Martin L. Bodkin, M. D. E. B. Treat & Co., New York. Price $3.50.

In these times of deluge of medical books, there seem to be three reasons for publishing things: firstly, to advertise the author; secondly, to keep the publisher's literary pot a-boiling; and thirdly, because the author really has something worth while to give to the world. If only the last reason prevailed we should be spared numerous publications that merely serve to litter the shelves of the too credulous doctor. The book in question seems to be one of this class. It does not fill any long-felt want nor does it tell us anything that has not been told before. We cannot recommend it to the medical profession. A. N.

Wayside Experiences. A collection of plain tales as heard along the road. By C. Elton Blanchard, M. D.; 246 pages; cloth bound. Price $1.25. Physicians' Drug News, Publishers, Newark, N. J.

In a genial, pleasant, conversational way Dr. Blanchard has gathered a dozen little tales of the intimate things of life as seen by the physician with a philosophic turn of mind and a certain amount of literary ability. They are agreeable reading: amusing, instructive and occasionally give food for thought. Eugenics, right living, good moral standards, a developed sense of responsibility, are all neatly brought out and constitute the moral that adorns the tale. The time spent in looking through this little book will be thoroughly enjoyed. G. H. T.

A System of Surgery. In three volumes. By Choyce and Beattie. Published by Funk & Wagnalls. Pacific Coast agents, Stacey & Waite, 405 Van Ness avenue.

This work is one of those that revives one's faith in text-books. The ground covered includes in Vol. I surgical pathology and general surgery. Vols. II and III "are mainly occupied with a systematic description of surgical diseases and conditions, including preparation of the patient for operation and after treatment." The authors are mostly British and there is frequent reference to other authorities, American, German and French. The bibliography is very complete in each section. The illustrations are very numerous and especially those of the pathological specimens are excellently executed, original and instructive. It is also from the point of view of pathology that this work appeals so strongly.

The work does not claim to be and is not a manual of surgery considered from the technical aspect. It is a book in which one finds surgery discussed as a mode of treatment with especial reference to and emphasis on the pathology furnishing the surgical indications; and this is the feature that makes it as valuable and attractive to the student and general practitioner as to the surgeon **per se.**

The chapter on tumors furnishes a very acceptable link between the evidence as derived from the patient and the knowledge elaborated in the laboratory.

The sections devoted to the gastro-intestinal tract are very fine examples of the correlation of the physiology and pathology with the rationale of the surgical treatment.

For those interested in surgery, either as surgeons or as internists, these volumes will richly repay their perusal.

The style is clear, concise and the book is a practical one in every way. G. H. T.

Applied Bacteriology for Nurses. By Charles F. Bolduan, M. D., Assistant to the General Medical Officer, Department of Health, City of New York, and Marie Grund, M. D., Bacteriologist, Department of Health, City of New York. 12mo. of 166 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1913. Cloth, $1.25 net.

This little book of 160 pages is very clearly written and should be of great value to any nurse who wishes a general, if somewhat superficial knowledge of bacteriology. It fully carries out its author's intention to give a nurse "a clear conception of the principles underlying her work," which is all most nurses want or require in this branch of medicine, and is easily read and understood. The chapters on the special bacteriology of the various injections go into more detail as to morphology, cultural growth, etc., than most of their readers will understand or be interested in, but those on disinfection, sterilization, and transmission of diseases are thoroughly practical and valuable. The value of the book is greatly enhanced by the numerous excellent and well-chosen illustrations which it contains. A. W.

The Surgical Clinics of John B. Murphy, M. D. Vol. ii, No. 3. June, 1913. W. B. Saunders Co., Philadelphia.

Contents.

Obturation Ileus: Obstruction Due to Large Gall-Stone in Ileum.

Intestinal Stasis Caused by Band of Adhesions.

Paratracheal Tumor—Cystic Adenoma of Thyroid.

Desmoid Tumor of the Rectus Muscle.

Plastic Operation on Ear (Ear Bitten Off by a Horse).

Tenoplasty of Flexor Tendons of Fingers.

Ankylosis of the Jaw. (Interposition of mucous membrane flaps taken from palate and floor of mouth.)

Subcoracoid Dislocation of the Humerus with Separation of Tuberosity.

Fracture of Neck of Femur: Displacement of Head on Dorsum of Ilium.

Fracture and Dislocation of Scaphoid and Semilunar Bones.

Dislocated Semilunar Cartilage Displaced Across Median Line of Joint.

Infectious Granuloma of the Caput Coli—Resection of the Cecum and Anastomosis of the Ileum to the Ascending Colon.

Arthroplasty of the Hip—Trochanter Placed in Acetabulum to Form a New Joint.

Pott's Disease. (The operation of bone-grafting for its cure, as devised by Dr. F. H. Albee, of New York City. A Talk by Dr. Albee at Mercy Hospital.) Clinic at St. Luke's Hospital, Chicago, by Dr. F. H. Albee of New York City.

Procidentia Uteri. (Dr. Murphy's method of fixing the uterus.)

Cholecystitis: Symptomatic Diabetes Mellitus Due to Gall-Bladder Infection.

Clinic Held by Dr. Murphy at Mercy Hospital for the Chicago Surgical Society, March 1, 1913.

Acute Suppurative Prostatitis. (Early drainage into urethra; subsequent leakage through capsule, with infection of the perirectal tissues; Ischiorectal abscess; incision, breaking down partitions between pus-pockets, and drainage; unimpeded recovery.)

Massage. Manual Treatment, Remedial Movements. History, mode of application and effect; indications and contra-indications. By Douglas Graham, M. D., consultant and instructor in massage, Boston, Mass. With a chapter on Massage of the Eye by Dr. A. Darier, Paris. 4th edition. J. B. Lippincott Company, Philadelphia, 1913.

After a long introduction on the history of massage, the author dismisses the "manipulations" of massage in one single chapter, omitting many important technical details. This shows, from the start, that his work is not intended for students or beginners.

As a reference book, it will be of some value to the clinician and to the general practitioner who wants to know if a given condition is amenable to massage, and with what results. The treatise is written somewhat as a panegyric of massage; certain things, which everybody takes for granted nowadays, are detailed at considerable length, while other rather doubtful and questionable results are presented in too favorable a light, and without sufficient clinical evidence. Another weak point of this book lies in the fact, that most papers quoted by the author date as far back as the eighties or the seventies, and there is a lack of information about the more recent literature on the subject. For instance, many men are mentioned in support of gynecological massage, but the names of well-known modern gynecologists are conspicuously absent, from which we conclude that gynecological massage must have lost ground. Similarly, dilatation of the stomach being now considered as often secondary to pyloric ulcer and not as an entity, will seldom be cured by massage alone.

The author is far too optimistic in his views on acute intestinal obstruction and intussusception; we do not mind trying massage of the abdomen once, in these conditions, but if no prompt result follows, we hold that immediate operation is now the rule.

In his excellent chapter on synovitis the author ought to have given to his readers some hints for the detection of tubercular disease so that massage of this condition could be surely avoided. We do not agree with his endorsement of massage in fracture of the patella when the fragments are widely separated, and we think that even a skilful masseur makes a great mistake in trying massage in cases of acute phlebitis. We regret to see that compressed hot air massage is not even mentioned.

The best parts of the work are those on massage in neurasthenia, sprains, constipation, writer's cramp, neuralgia and muscular affections. The author speaks here very convincingly and is backed by a great personal experience.

In our opinion this book will appeal more to the profession-masseurs, in showing them what cases to treat and those not to treat; they may confidently follow the author as a reliable guide in the recognized fields of massage, but they will do well to take some of his suggestions "cum grano salis" and not to expect too much from their skill in irreparable organic diseases, such as valvular disease of the heart, emphysema, locomotor ataxia, progressive muscular paralysis and the like. Assertions that "lobar pneumonia is shortened or aborted" by rubbing the thorax and that "massage of the gall-bladder will aid the 'fracture' of the stones" preliminary to their expulsion, must also not be taken too seriously.

The text is pleasant and full of amusing anecdotes and witty remarks, which make the book very easy reading. P. C.

Tuberculin in Diagnosis and Treatment. By Francis Marion Pottenger, A. M., LL. D., Medical Director of the Pottenger Sanatorium for Diseases of the Lungs and Throat, Monrovia, California. 243 pages, royal octavo, 35 illustrations, including one colored plate. Price, $3.00.

In this monograph the author has presented a comprehensive review of the use of tuberculin. The first five chapters are devoted to a consideration of its usefulness from the diagnostic stand-

point. The different methods usually employed are taken up, namely, the subcutaneous, cutaneous, percutaneous and conjunctival. The author has wisely gone minutely into a consideration of the necessity of careful interpretation of these tests. Much confusion has arisen and the value of tuberculin as a diagnostic test has been much belittled because of careless technic, more careless observation of reactions and faulty interpretation of results. That the tuberculin reaction is of great value in the diagnosis of present tuberculous infection, all who have had experience in the intelligent use of it must agree. The value of the test in indicating active disease depends entirely on the intelligence and accuracy with which the observer interprets these tests. The author has emphasized its value in distinguishing between active and latent lesions by means of the time in which the reaction appears. He has properly emphasized, however, the necessity of an intelligent correlation between the physical signs and the reaction. This emphasis is timely. Tuberculin has been discredited as a diagnostic measure, largely because it is being used too much as a short cut to diagnosis by many who have not sufficiently appreciated its limitations or have totally overlooked the well established theories of immunity on which its activity depends. In this discussion it is to be regretted that the author has neglected to consider the value of the intracutaneous test, a method which in the opinion of the reviewer is oftentimes of much greater value than the cutaneous, in that it admits of absolute accuracy in dosage. It is to be hoped that in a future edition of this work the intracutaneous method may have its place.

In the chapters on treatment the author has properly emphasized the importance of individualization in the size of the dose, in the method of increase, and in the interval between dosage. Routine treatment cannot give good results. The difference between the small infrequent dose, popularly known as Wrights' method, and the method of producing immunity by gradually increasing dosage, has been fully discussed. The importance of latent tuberculosis and the duty of the physician to recognize it and not allow it to go on untreated and become active disease, has been called attention to. The importance of this is very great, for on this depends in a very large measure the ultimate eradication of the disease.

It would be impossible in a review to go into the author's discussion of the use of tuberculin in fever cases. The chapters devoted to the subject should be read carefully by every one interested in this subject. It is one of the most complete discussions of the question that the reviewer has yet seen. While we may not entirely agree with Dr. Pottenger in all that he says regarding the causes of fever in tuberculosis; while we may not be willing to accede to his insistence on the importance of enzymes as a chief cause of fever in the advanced case; while we may see great danger in advocating the general use of tuberculin in febrile cases, it must be admitted that he has handled this intricate subject in a most logical way which is very convincing.

The rather delicate question as to whether the general practitioner should administer tuberculin is handled with directness. In as widespread a disease as tuberculosis there must be men in every community who shall qualify themselves to intelligently and safely use this remedy.

The appendix contains the translation of Koch's original papers, which will undoubtedly be of much interest to many readers.

Altogether the author has presented a monograph which is a safe, sane guide to the administration of tuberculin. While an enthusiast in its use, he has shown in the text that he is fully aware of its limitations. GEORGE H. EVANS.

LANE LECTURES.

The fourteenth course of Lane Medical Lectures will be delivered in Lane Hall, north side of Sacramento street near Webster, San Francisco, on the evenings of Sept. 3, 4, 5, 8 and 9, at eight o'clock sharp, by Prof. Sir Edward Schafer, Professor of Physiology, University of Edinburgh.

Program.

Sept. 3, 1913, on internal secretion in general.

Sept. 4, on the thyro-parathyroid glands.

Sept. 5, on the adrenal glandular apparatus.

Sept. 8, on the pituitary body.

Sept. 9, the influence of internal on other secretions.

Methods of Resuscitation. (To be delivered at Stanford University, Cal.)

All the lectures will be illustrated by lantern slides.

Demonstrations and clinics will be held for visiting physicians by the teaching staff of the Stanford University Medical Department throughout the period in which the evening lectures are given.

PACIFIC COAST OTO-OPTHALMOLOGICAL SOCIETY.

For the past twelve years spasmodic efforts have been made to organize the Eye, Ear, Nose and Throat specialists of the Pacific Coast.

Following Professor Fuch's lectures at Lane Hospital in San Francisco, two years ago, a temporary organization was affected. Through some misunderstanding with the California State Medical Society, the first meeting could not be held as it had been planned. However, in July of this year, the first regular meeting was held in Portland, Oregon, at the Hotel Oregon.

There were some seventy-five registered, of whom thirty were specialists scattered over the entire coast and guests from New York City.

The Eye, Ear, Nose and Throat Society of Portland entertained visiting members very handsomely by giving a smoker the first evening and a dinner and an automobile ride the second evening.

Our retiring president, Doctor Dixon, of Portland, entertained the visiting members at luncheon the first day.

Permanent organization was effected. The society extended its boundary lines to include everything west of the Rocky Mountains and in British Columbia.

The program was excellent in every particular. The entire transactions pertaining to the eye will be published through the courtesy of Dr. Wurdemann in the Journal of Ophthalmology and every member will receive a copy. In the near future we hope to be officially identified with an Eye, Ear, Nose and Throat Journal.

The next meeting will be in Seattle; date not fixed but probably early in July.

The following officers were elected: President, Clinton T. Cooke, Seattle; First Vice-President, Edward E. Maxey, Boise, Idaho; Second Vice-President, John F. Beaumont, Portland, Ore.; Secretary and Treasurer, Cullen F. Welty, San Francisco.

All members of the present organization will become charter members of the College of Surgeons of America by filling out the blanks that will be forwarded them in due course of time.

C. F. WELTY, Secretary and Treasurer.

FREE BEDS.

Through the kindness of a friend, four beds at the University of California Hospital have been endowed for the care and study of female patients with inoperable cancer. The admission of deserving patients, recommended by physicians, will be considered.

DISAPPROVAL.

To the Editor of the State Journal:

Dear Sir:—I have read with extreme regret some of the editorials which have appeared in recent issues of the State Journal, and particularly wish to protest against the two referring to our State Legislature.

The function of the State Journal is to advance scientific medicine and advance the interests of the medical profession owning the Journal. If medicine is to succeed it must stand on its merits. The profession must be aggressive and emphasize the things for which scientific medicine stands. If the profession desires to enter into politics it should be in a dignified manner. We should put before the public and the legislative bodies the truths about our profession and the aims of scientific and preventive medicine. We should make an earnest and a fair fight to see that the principles which we stand for, as far as they relate to the public and public health, are upheld.

I consider it very unfortunate, however, and exceedingly undignified that two such editorials as the ones mentioned should have appeared in our State Journal; for it being our official organ, they appear as representing the sentiment of the medical profession of this state. I have talked with numbers of men regarding this matter and so far I have failed to find a single one who did not regret their appearance and who did not feel that they misrepresented the State Society.

Sincerely yours,

F. M. POTTENGER.

NEW AND NONOFFICIAL REMEDIES.

Since publication of New and Nonofficial Remedies, 1913, and in addition to those previously reported, the following articles have been accepted by the Council on Pharmacy and Chemistry of the American Medical Association for inclusion with "New and Nonofficial Remedies":

Emetine Hydrochloride.—Emetine Hydrochloride is the hydrochloride, $C_{30}H_{44}N_2O_4.2HCl.2H_2O$, of an alkaloid found in ipecac. It occurs as a white crystalline powder, soluble in water yielding a neutral solution. Emetine Hydrochloride acts similarly to ipecac but is relatively more nauseant and less emetic, and causes relatively less renal irritation, but more cardiac depression. Emetine Hydrochloride in the form of injections has been reported to be of especial value in amebic dysentery. Emetine Hydrochloride, Merck.—Merck and Co., New York.

Ampules Emetine Hydrochloride, Mulford.—Each ampul contains emetine hydrochloride 30 mg. H. K. Mulford Co., Philadelphia, Pa. (Jour. A. M. A., July 5, 1913, p. 27).

Acne Vaccine.—For description of Acne Vaccine see N. N. R., 1913, p. 221. Greeley Laboratories, Inc., New York City.

Colon Vaccine.—For description of Bacillus Coli Vaccine see N. N. R., 1913, p. 221. Greeley Laboratories, Inc., New York City.

Pyocyaneus Vaccine.—For description of Bacillus Pyocyaneus Vaccine see N. N. R., 1913, p. 222. Greeley Laboratories, Inc., New York City.

Gonococcus Vaccine.—For description of Gonococcus Vaccine see N. N. R., 1913, p. 223. Greeley Laboratories, Inc., New York City.

Meningococcus Vaccine.—For description of Meningoccoccus Vaccine see N. N. R., 1913, p. 223. Greeley Laboratories, Ins., New York City.

Pneumococcus Vaccine.—For description of Pneumococcus Vaccine see N. N. R., 1913, p. 224. Greeley Laboratories, Inc., New York City.

Staphyloccoccus Albus Vaccine.—Greeley Laboratories, Inc., New York City.

Staphyloccoccus Aureus Vaccine.—For description of Staphyloccoccus Vaccine see N. N. R., 1913, p. 225. Greeley Laboratories, Inc., New York City.

Streptococcus Vaccine.—Greeley Laboratories, Inc., New York City.

Streptococcus Erysipelatis Vaccine.—For description of Streptococcus Vaccine see N. N. R., 1913, p. 226. Greeley Laboratories, Inc., New York City.

Typhoid Bacillus Vaccine.—For description of Typhoid Bacillus Vaccine see N. N. R., 1913, p. 227. Greeley Laboratories, Inc., New York City.

Tuberculin B. E.—For description of New Tuberculin, Koch, Bacilli Emulsion ("B. E.") see N. N. R., 1913, p. 233. Greeley Laboratories, Inc., New York City (Jour. A. M. A., July 5, 1913, p. 27).

Diplosal.—Diplosal is the salycylic ester of salycylic acid, $HO.C_6H_4COO.C_6H_4COOH$. It is white, almost tasteless and almost insoluble in water. While diplosal is insoluble in dilute acid, it is soluble in alkaline liquids with gradual liberation of salicylic acid, accordingly it passes the stomach unchanged, but is readily absorbed in the intestine. Diplosal may be used where salicylic acid or salicylic acid derivatives are indicated. It is marketed as a powder and in tablets.

Diplosal Tablets 7½ grs.—Each tablet contains 0.5 Gm. diplosal. Merck and Co., New York (Jour. A. M. A., July 12, 1913, p. 121).

NEW MEMBERS.

Villain, Albert J., San Francisco.
Willcutt, Geo. Hayes, San Francisco.
Rose, J. M., San Francisco.
Woodward, R. M. (U. S. P. H. S.), San Francisco.
Smith, Charline R., Los Angeles.
Burrell, H. L., Hollywood, Cal.
Bowen, Fred P., Los Angeles.
Carter, J. M. G., Los Angeles.
Shulman, Leon, Los Angeles.
Weaver, Don Dickenson, Oakland, Cal.
Parrish, Frederick W., Los Banos, Cal.
Jacobson, P. N., Turlock, Cal.
Reardon, F. B., Turlock, Cal.
Julien, E. A., Turlock, Cal.
Kinne, E. F., Atwater, Cal.
Saeger, B. L., Nordhoff, Cal.
Mott, D. W., Santa Paula, Cal.
Ormsby, E. A., Centerville, Cal.
Malone, Wm. M., Oakland, Cal.
O'Brien, J. W., Sacramento, Cal.

DEATHS.

Murphy, Geo. S., San Diego, Cal.
Shoemaker, David, Auburn, Cal.
Miller, Eliza M., Los Angeles.
Horton, W. N., Los Angeles.
Alumbaugh, Wm. E., Napa, Cal.
Sheurer, B. W., Long Beach.
Sisson, Ellet Orrin (address unknown, died in Denver, Colo.)
Sinclair, Jas., San Luis Obispo, Cal.
Brink, H. O., Berkeley, Cal.
French, R. A. (address unknown, died in San Diego, Cal.)
Vandre, Hippolyte, San Francisco.